

APPENDIX C

IMPORTANCE OF MISSING TOXICITY PARAMETERS

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IMPORTANCE OF MISSING TOXICITY PARAMETERS

The hazard index and cancer risk for chemicals are calculated using both ingestion and inhalation exposures. However, many chemicals lack either the inhalation or ingestion benchmark against which to calculate the hazard index or cancer risk. In Section 3.0 of the main text, the calculations are carried out using the assumption that the missing route will have no effect on the final hazard index or slope factor. In other words, the calculation ignores the route of entry (inhalation or ingestion) for which there is no toxicity guidance.

This appendix makes an estimate of the missing toxicity parameter and calculates the hazard index and increased cancer risk factors for the scenarios discussed in the main text. In addition, tables of ratios of the factors are provided to identify chemicals for which the missing route may be a significant contributor to the final result. This is consistent with the recommendations found in Section 2.1 and Appendix B of the *Soil Screening Guidance: Technical Background Document*, (EPA/540/R95/128).

ROUTE-TO-ROUTE EXTRAPOLATION

Several chemicals have a reference dose or slope factor given for ingestion, but none for inhalation, or vice-versa. In this appendix, the missing value was estimated using the given value. The estimated values are noted in Table C1. In the EPA *Soil Screening Guidance: Technical Background Document* (EPA/540/R95/128) this process of imputing the missing value from the given value is referred to as “route-to-route extrapolation”. Appendix B of EPA/540/R95/128 illustrates the process by using the same value for inhalation as was determined for ingestion.

Note that route-to-route extrapolation is used in the IRIS database for some chemicals. For example, the slope factor for ingestion of benzene (CAS 71-43-2) is calculated as twice the slope factor for inhalation. The factor of two arises from the likely range of absorption fractions via inhalation being between 20% and 50% of the absorption fraction via ingestion.

There are two extrapolation methods used in the present report to estimate the missing slope factors or reference doses. The first method uses a factor of two on the general grounds that the most significant route has been evaluated first. The missing route is likely to be of less concern. Hence, missing slope factors are half the given value, while missing reference doses are twice the given value. The second extrapolation method is applied only to cadmium compounds (CAS 7440-43-9) and chromium (VI) compounds (CAS 18540-29-9). For these inorganic compounds, the observed cancers from the inhalation route are all lung cancers. This means the ingestion slope factor must be much smaller. Material that is inhaled is exhaled or deposits in the respiratory system. The deposited material is either absorbed into body fluids or mechanically removed from the lung and swallowed. Thus, the inhalation route includes an ingestion route. If cadmium and chromium (VI) compounds were significant oral hazards then other types of cancer would have been observed. It should be noted that there are cancers with longer latency periods than lung cancer. Thus the ingestion slope factor may not be zero, as has

been assumed. It is believed to be orders of magnitude smaller than the inhalation slope factor, so the value of zero will be used in the present report nonetheless. The extrapolated values are noted with “x” in Table C1.

Table C1. Imputed Values for Reference Doses and Cancer Induction Slope Factors.

CASRN	Chemical Name	Reference Dose (mg/kg-day)		Cancer Slope Factor (mg/kg-day) ⁻¹	
		Ingestion	Inhalation	Ingestion	Inhalation
50-32-8	Benzo[a]pyrene	na	na	7.30E+00 e	3.65E+00 x
53-70-3	Dibenz[a,h]anthracene	na	na	7.30E+00 r	3.08E+00 r
56-23-5	Carbon tetrachloride	7.00E-04 e	1.40E-03 x	1.30E-01 e	5.25E-02 e
57-12-5	Cyanide, free	2.00E-02 e	4.00E-02 x	na	na
57-14-7	1,1-Dimethylhydrazine	na	na	3.00E+00 r	1.72E+01 r
57-55-6	Propylene glycol (1,2-Propanediol)	2.00E+01 h	4.00E+01 x	na	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	3.00E-04 e	6.00E-04 x	1.30E+00 h	6.50E-01 x
60-34-4	Methylhydrazine	na	na	3.00E+00 r	1.72E+01 r
60-57-1	Dieldrin	5.00E-05 e	1.00E-04 x	1.60E+01 e	1.61E+01 e
62-75-9	N-Nitrosodimethylamine	na	na	5.10E+01 e	4.90E+01 e
64-18-6	Formic acid	2.00E+00 h	4.00E+00 x	na	na
67-56-1	Methanol (Methyl alcohol)	5.00E-01 e	1.00E+00 x	na	na
67-64-1	Acetone (2-Propanone)	1.00E-01 e	2.00E-01 x	na	na
67-66-3	Chloroform	1.00E-02 e	2.00E-02 x	1.00E-03 e	8.05E-02 e
71-36-3	n-Butyl alcohol (n-Butanol)	1.00E-01 e	2.00E-01 x	na	na
71-43-2	Benzene	4.00E-03 e	8.57E-03 e	5.50E-02 e	2.73E-02 e
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	2.00E-01 r	6.29E-01 r	na	na
72-20-8	Endrin	3.00E-04 e	6.00E-04 x	na	na
74-83-9	Bromomethane	1.40E-03 e	1.43E-03 e	na	na
74-87-3	Methyl chloride (Chloromethane)	5.14E-02 x	2.57E-02 e	na	na
75-00-3	Ethyl Chloride	5.72E+00 x	2.86E+00 e	na	na
75-01-4	Vinyl chloride (Chloroethene)	3.00E-03 e	2.86E-02 e	1.40E+00 e	3.08E-02 e
75-05-8	Acetonitrile	3.42E-02 x	1.71E-02 e	na	na
75-07-0	Acetaldehyde	5.14E-03 x	2.57E-03 e	3.85E-03 x	7.70E-03 e
75-09-2	Dichloromethane (Methylene chloride)	6.00E-02 e	8.57E-01 h	7.50E-03 e	1.65E-03 e
75-15-0	Carbon disulfide	1.00E-01 e	2.00E-01 e	na	na
75-21-8	Ethylene Oxide (Oxirane)	na	na	1.02E+00 h	3.50E-01 h
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.00E-01 h	1.43E-01 h	na	na
75-35-4	1,1-Dichloroethylene	5.00E-02 e	5.71E-02 e	na	na
75-45-6	Chlorodifluoromethane	2.86E+01 x	1.43E+01 e	na	na
75-68-3	Chloro-1,1-difluoroethane, 1-	2.86E+01 x	1.43E+01 e	na	na
75-69-4	Trichlorofluoromethane	3.00E-01 e	2.00E-01 h	na	na
75-71-8	Dichlorodifluoromethane	2.00E-01 e	5.71E-02 h	na	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	3.00E+01 e	8.57E+00 h	na	na
76-44-8	Heptachlor	5.00E-04 e	1.00E-03 x	4.50E+00 e	4.55E+00 e
78-87-5	1,2-Dichloropropane	3.00E-01 x	1.14E-03 e	na	na
78-93-3	Methyl ethyl ketone (2-Butanone)	6.00E-01 e	2.86E-01 e	na	na
79-00-5	1,1,2-Trichloroethane	4.00E-03 e	8.00E-03 x	5.70E-02 e	5.60E-02 e

Table C1. Imputed Values for Reference Doses and Cancer Induction Slope Factors.

CASRN	Chemical Name	Reference Dose (mg/kg-day)		Cancer Slope Factor (mg/kg-day) ⁻¹	
		Ingestion	Inhalation	Ingestion	Inhalation
79-01-6	Trichloroethylene	6.00E-03 r	1.20E-02 x	1.10E-02 r	5.95E-03 r
79-10-7	2-Propenoic acid (Acrylic acid)	5.00E-01 e	2.86E-04 e	na	na
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	na	2.00E-01 e	2.03E-01 e
82-68-8	Pentachloronitrobenzene (PCNB)	3.00E-03 e	6.00E-03 x	2.60E-01 h	1.30E-01 x
83-32-9	Acenaphthene	6.00E-02 e	1.20E-01 x	na	na
84-66-2	Diethyl phthalate	8.00E-01 e	1.60E+00 x	na	na
84-74-2	Dibutyl phthalate	1.00E-01 e	2.00E-01 x	na	na
85-68-7	Butyl benzyl phthalate	2.00E-01 e	4.00E-01 x	na	na
87-68-3	Hexachlorobutadiene	2.00E-04 h	4.00E-04 x	7.80E-02 e	7.70E-02 e
87-86-5	Pentachlorophenol	3.00E-02 e	6.00E-02 x	1.20E-01 e	6.00E-02 x
88-06-2	2,4,6-Trichlorophenol	na	na	1.10E-02 e	1.09E-02 e
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1.00E-03 e	2.00E-03 x	na	na
91-20-3	Naphthalene	2.00E-02 e	8.57E-04 e	na	na
92-52-4	1,1'-Biphenyl	5.00E-02 e	1.00E-01 x	na	na
95-50-1	1,2-Dichlorobenzene (ortho-)	9.00E-02 e	1.80E-01 x	na	na
95-63-6	1,2,4-Trimethylbenzene	5.00E-02 r	1.71E-03 r	na	na
98-86-2	Acetophenone	1.00E-01 e	2.00E-01 x	na	na
98-95-3	Nitrobenzene	5.00E-04 e	5.71E-04 h	na	na
100-25-4	1,4-Dinitrobenzene (para-)	4.00E-04 h	8.00E-04 x	na	na
100-41-4	Ethyl benzene	1.00E-01 e	2.86E-01 e	na	na
100-42-5	Styrene	2.00E-01 e	2.86E-01 e	na	na
100-51-6	Benzyl alcohol	3.00E-01 h	6.00E-01 x	na	na
106-46-7	1,4-Dichlorobenzene (para-)	4.58E-01 x	2.29E-01 e	2.40E-02 h	1.20E-02 x
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.14E-04 x	5.71E-05 h	8.50E+01 e	7.70E-01 e
106-99-0	1,3-Butadiene	1.14E-03 x	5.71E-04 e	5.25E-02 x	1.05E-01 e
107-02-8	Acrolein	5.00E-04 e	5.71E-06 e	na	na
107-05-1	3-Chloropropene (Allyl chloride)	5.00E-02 h	2.86E-04 e	na	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	na	9.10E-02 e	9.10E-02 e
107-13-1	Acrylonitrile	1.00E-03 h	5.71E-04 e	5.40E-01 e	2.38E-01 e
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.71E+00 x	8.57E-01 e	na	na
108-67-8	1,3,5-Trimethylbenzene	5.00E-02 r	1.71E-03 r	na	na
108-87-2	Methyl cyclohexane	1.71E+00 x	8.57E-01 r	na	na
108-88-3	Toluene (Methyl benzene)	2.00E-01 e	1.14E-01 e	na	na
108-90-7	Chlorobenzene	2.00E-02 e	5.71E-03 h	na	na
108-94-1	Cyclohexanone	5.00E+00 e	1.00E+01 x	na	na
108-95-2	Phenol (Carbolic acid)	3.00E-01 e	6.00E-01 x	na	na
110-00-9	Furan (Oxacyclopentadiene)	1.00E-03 e	2.00E-03 x	na	na
110-54-3	n-Hexane	6.00E-02 h	5.71E-02 e	na	na
110-86-1	Pyridine	1.00E-03 e	2.00E-03 x	na	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	5.00E-01 e	3.71E+00 e	na	na

Table C1. Imputed Values for Reference Doses and Cancer Induction Slope Factors.

CASRN	Chemical Name	Reference Dose (mg/kg-day)		Cancer Slope Factor (mg/kg-day) ⁻¹	
		Ingestion	Inhalation	Ingestion	Inhalation
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	2.00E+00 h	4.00E+00 x	na	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	2.00E-02 e	4.00E-02 x	1.40E-02 e	7.00E-03 x
117-84-0	Di-n-octylphthalate	2.00E-02 h	4.00E-02 x	na	na
118-74-1	Hexachlorobenzene	8.00E-04 e	1.60E-03 x	1.60E+00 e	1.61E+00 e
120-82-1	1,2,4-Trichlorobenzene	1.00E-02 e	5.71E-02 h	na	na
121-44-8	Triethylamine	4.00E-03 x	2.00E-03 e	na	na
122-39-4	Diphenylamine	2.50E-02 e	5.00E-02 x	na	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	na	1.10E-02 e	5.50E-03 x
126-73-8	Tributyl Phosphate	2.00E-01 r	4.00E-01 x	5.40E-03 r	2.70E-03 x
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	1.00E-04 e	2.00E-04 h	na	na
127-18-4	1,1,2,2-Tetrachloroethylene	1.00E-02 e	1.71E-01 r	5.20E-02 r	2.03E-03 r
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	9.00E-01 e	1.80E+00 x	na	na
156-59-2	cis-1,2-Dichloroethylene	1.00E-02 h	2.00E-02 x	na	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	4.00E-02 e	8.00E-02 x	na	na
309-00-2	Aldrin	3.00E-05 e	6.00E-05 x	1.70E+01 e	1.72E+01 e
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	na	6.30E+00 e	6.30E+00 e
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	na	1.80E+00 e	1.86E+00 e
621-64-7	N-Nitrosodi-N-propylamine	na	na	7.00E+00 e	3.50E+00 x
1314-62-1	Vanadium pentoxide	9.00E-03 e	1.80E-02 x	na	na
1330-20-7	Xylenes (mixtures)	2.00E-01 e	2.86E-02 e	na	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	na	2.00E+00 e	1.00E+00 x
1336-36-3	Polychlorinated Biphenyls (low risk)	na	na	4.00E-01 e	2.00E-01 x
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	na	7.00E-02 e	3.50E-02 x
6533-73-9	Thallium carbonate	8.00E-05 e	1.60E-04 x	na	na
7429-90-5	Aluminum	1.00E+00 r	1.43E-03 r	na	na
7439-96-5	Manganese	1.40E-01 e	1.43E-05 e	na	na
7439-98-7	Molybdenum	5.00E-03 e	1.00E-02 x	na	na
7440-02-0	Nickel (soluble salts)	2.00E-02 e	4.00E-02 x	na	na
7440-22-4	Silver	5.00E-03 e	1.00E-02 x	na	na
7440-24-6	Strontium, Stable	6.00E-01 e	1.20E+00 x	na	na
7440-31-5	Tin	6.00E-01 h	1.20E+00 x	na	na
7440-36-0	Antimony	4.00E-04 e	8.00E-04 x	na	na
7440-38-2	Arsenic (inorganic)	3.00E-04 e	6.00E-04 x	1.50E+00 e	1.51E+01 e
7440-39-3	Barium	7.00E-02 e	1.43E-04 h	na	na
7440-41-7	Beryllium and compounds	2.00E-03 e	5.71E-06 e	4.20E+00 x	8.40E+00 e
7440-42-8	Boron and borates only	9.00E-02 e	5.71E-03 h	na	na
7440-43-9	Cadmium	5.00E-04 e	1.00E-03 x	0.00E+00 x	6.30E+00 e
7440-48-4	Cobalt	2.00E-02 r	5.71E-06 r	4.90E+00 x	9.80E+00 r
7440-66-6	Zinc and compounds	3.00E-01 e	6.00E-01 x	na	na
7487-94-7	Mercuric chloride	3.00E-04 e	1.71E-04 x	na	na
7664-41-7	Ammonia	5.72E-02 x	2.86E-02 e	na	na
7723-14-0	Phosphorus, white	2.00E-05 e	4.00E-05 x	na	na

Table C1. Imputed Values for Reference Doses and Cancer Induction Slope Factors.

CASRN	Chemical Name	Reference Dose (mg/kg-day)		Cancer Slope Factor (mg/kg-day) ⁻¹	
		Ingestion	Inhalation	Ingestion	Inhalation
7782-41-4	Fluorine (soluble fluoride)	6.00E-02 e	1.20E-01 x	na	na
7782-49-2	Selenium and compounds	5.00E-03 e	1.00E-02 x	na	na
8001-35-2	Toxaphene	na	na	1.10E+00 e	1.12E+00 e
14797-55-8	Nitrate	1.60E+00 e	3.20E+00 x	na	na
14797-65-0	Nitrite	1.00E-01 e	2.00E-01 x	na	na
16065-83-1	Chromium (III) (insoluble salts)	1.50E+00 e	3.00E+00 x	na	na
18540-29-9	Chromium (VI) (soluble salts)	3.00E-03 e	2.29E-06 e	0.00E+00 x	4.20E+01 e
none	Uranium (soluble salts)	6.00E-04 e	1.20E-03 x	na	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- “e” means the number is from IRIS as of June, 2003
- “r” means the number is from RAIS as of June, 2003
- “h” means the number in RAIS is from HEAST
- “x” means the number was generated for this report using the methods described in the text
- **Slope factors** give an upper bound on the probability that some type of cancer develops as a result of a lifetime exposed to a given chemical. The slope factor is multiplied by the lifetime average daily chemical dose to give the lifetime risk. Two special cases are noted below.
 - The slope factors for vinyl chloride (CAS 75-01-4) apply to the general population. When applying these to occupationally exposed individuals (industrial exposure scenario), the values are reduced by a factor of 2.
 - The slope factors for PCBs (CAS 1336-36-3) are reduced for population (collective) exposures. The slope factors used for high, low and lowest risk PCBs are 1.0, 0.3, and 0.04 per mg/kg per day.
- **Reference dose** is an estimate of a daily dose to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Special cases are noted below.
 - The RfD for manganese in drinking water is 1/3 the dietary RfD shown on the table.
 - The RfD for dietary cadmium is twice the drinking water RfD shown on the table.
 - The RfD for airborne particulate containing chromium (VI) is 2.86E-05 mg/kg per day.

The unit hazard index and unit cancer risk factors are shown in the remaining tables in this appendix. The first of these tables (Table C2) summarizes the ratios between unit factors using the route-to-route extrapolation and unit factors that ignore the missing toxicity parameter. Ratios less than 2 are not listed in the summary table. If any of the chemicals with a significant increase are important in the risk assessment, the missing toxicity parameter should be determined in a manner that is both technically sound and acceptable to the appropriate regulatory authority.

Table C2. Summary of Unit Factor Comparison Ratios.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	5.5		5.5	
57-12-5	Cyanide, free	5.9		5.9	
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	2.0	2.0	2.0	2.0
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	2.4		2.4	
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)	6.0		6.0	
67-66-3	Chloroform	5.4		5.4	
71-36-3	n-Butyl alcohol (n-Butanol)	2.8		2.8	
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)	11		22	
75-00-3	Ethyl Chloride	11		21	
75-01-4	Vinyl chloride (Chloroethene)				
75-05-8	Acetonitrile	11		22	
75-07-0	Acetaldehyde	11	11	22	34
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane	11		16	
75-68-3	Chloro-1,1-difluoroethane, 1-	11		43	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				

Table C2. Summary of Unit Factor Comparison Ratios.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
76-44-8	Heptachlor	3.5		3.5	
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	5.9		5.9	
79-01-6	Trichloroethylene	4.7		4.7	
79-10-7	2-Propenoic acid (Acrylic acid)				
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	5.0	5.0	5.0	5.0
83-32-9	Acenaphthene	3.1		3.1	
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	3.8		3.8	
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	3.5		3.5	
95-50-1	1,2-Dichlorobenzene (ortho-)	5.0		5.0	
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone	3.1		3.1	
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)	12	5.0	313	5.0
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	11		33	
106-99-0	1,3-Butadiene	11	12	37	68
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	11		19	
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane	13		434	
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone	2.8		2.8	
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	5.9		5.9	
110-54-3	n-Hexane				

Table C2. Summary of Unit Factor Comparison Ratios.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
110-86-1	Pyridine	3.2		3.2	
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	2.4		2.4	
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	11		21	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)		2.0		2.0
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	6.0		6.0	
156-59-2	cis-1,2-Dichloroethylene	5.9		5.9	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)				
309-00-2	Aldrin	2.2		2.2	
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine		2.1		2.1
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		2.1		2.1
1336-36-3	Polychlorinated Biphenyls (low risk)		2.1		2.1
1336-36-3	Polychlorinated Biphenyls (lowest risk)		2.1		2.1
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum	6.0		6.0	
7440-02-0	Nickel (soluble salts)	6.0		6.0	
7440-22-4	Silver	5.9		5.9	
7440-24-6	Strontium, Stable	5.9		5.9	
7440-31-5	Tin	5.6		5.6	
7440-36-0	Antimony	5.2		5.2	
7440-38-2	Arsenic (inorganic)	5.9		5.9	
7440-39-3	Barium				
7440-41-7	Beryllium and compounds		13		841
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	4.8		4.8	
7440-48-4	Cobalt		11		2,203
7440-66-6	Zinc and compounds	6.0		6.0	

Table C2. Summary of Unit Factor Comparison Ratios.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
7487-94-7	Mercuric chloride	18		18	
7664-41-7	Ammonia	608		609	
7723-14-0	Phosphorus, white	5.9		5.9	
7782-41-4	Fluorine (soluble fluoride)	6.0		6.0	
7782-49-2	Selenium and compounds	6.0		6.0	
8001-35-2	Toxaphene				
14797-55-8	Nitrate	6.0		6.0	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The table shows the largest ratio found in all of the exposure scenarios. Ratios less than 2.0 are not listed.

Table C3. Unit Factors for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	7.01E-01 d	na	4.93E+00 d
53-70-3	Dibenz[a,h]anthracene	na	1.61E+00	na	1.43E+01
56-23-5	Carbon tetrachloride	1.53E+02 b	5.10E-03	1.58E+02 b	5.32E-03
57-12-5	Cyanide, free	4.73E+02 b	na	4.73E+02 b	na
57-14-7	1,1-Dimethylhydrazine	na	4.58E+00	na	4.58E+00
57-55-6	Propylene glycol (1,2-Propanediol)	5.72E-02 b	na	5.73E-02 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	2.47E+02 b	4.13E-02 d	3.13E+02 b	5.22E-02 d
60-34-4	Methylhydrazine	na	3.43E+00	na	3.43E+00
60-57-1	Dieldrin	1.51E+03 b	7.43E-01	8.94E+03 b	3.29E+00
62-75-9	N-Nitrosodimethylamine	na	3.69E+01	na	3.69E+01
64-18-6	Formic acid	4.82E-01 b	na	4.83E-01 b	na
67-56-1	Methanol (Methyl alcohol)	1.26E+00 b	na	1.26E+00 b	na
67-64-1	Acetone (2-Propanone)	2.77E+00 b	na	2.78E+00 b	na
67-66-3	Chloroform	1.10E+01 b	5.48E-03	1.11E+01 b	5.48E-03
71-36-3	n-Butyl alcohol (n-Butanol)	1.33E+00 b	na	1.34E+00 b	na
71-43-2	Benzene	2.62E+01	2.58E-03	2.65E+01	2.61E-03
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	3.91E-01	na	4.02E-01	na
72-20-8	Endrin	4.68E+02 b	na	1.39E+03 b	na
74-83-9	Bromomethane	1.36E+02	na	1.36E+02	na
74-87-3	Methyl chloride (Chloromethane)	6.92E+00 a	na	6.93E+00 a	na
75-00-3	Ethyl Chloride	6.10E-02 a	na	6.11E-02 a	na
75-01-4	Vinyl chloride (Chloroethylene)	1.58E+01	2.06E-02	1.60E+01	2.08E-02
75-05-8	Acetonitrile	1.72E+01 a	na	1.72E+01 a	na
75-07-0	Acetaldehyde	9.64E+01 a	8.17E-04 c	9.65E+01 a	8.18E-04 c
75-09-2	Dichloromethane (Methylene chloride)	7.84E-01	2.28E-04	7.88E-01	2.28E-04
75-15-0	Carbon disulfide	1.08E+00	na	1.09E+00	na
75-21-8	Ethylene Oxide (Oxirane)	na	8.51E-02	na	8.52E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.42E+00	na	1.42E+00	na
75-35-4	1,1-Dichloroethylene	3.35E+00	na	3.37E+00	na
75-45-6	Chlorodifluoromethane	1.23E-02 a	na	1.23E-02 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	1.95E-02 a	na	1.95E-02 a	na
75-69-4	Trichlorofluoromethane	8.90E-01	na	8.98E-01	na
75-71-8	Dichlorodifluoromethane	2.92E+00	na	2.93E+00	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	1.94E-02	na	1.96E-02	na
76-44-8	Heptachlor	3.01E+02 b	4.46E-01	2.86E+03 b	2.91E+00
78-87-5	1,2-Dichloropropane	1.39E+02 a	na	1.39E+02 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	7.65E-01	na	7.66E-01	na
79-00-5	1,1,2-Trichloroethane	2.90E+01 b	4.70E-03	2.91E+01 b	4.71E-03
79-01-6	Trichloroethylene	1.84E+01 b	5.51E-04	1.87E+01 b	5.60E-04
79-10-7	2-Propenoic acid (Acrylic acid)	8.83E+00	na	8.83E+00	na

Table C3. Unit Factors for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	1.69E-02	na	1.71E-02
82-68-8	Pentachloronitrobenzene (PCNB)	3.82E+01 b	1.28E-02 d	7.03E+01 b	2.35E-02 d
83-32-9	Acenaphthene	2.17E+00 b	na	2.62E+00 b	na
84-66-2	Diethyl phthalate	1.17E-01 b	na	1.19E-01 b	na
84-74-2	Dibutyl phthalate	4.32E-01 b	na	1.19E+00 b	na
85-68-7	Butyl benzyl phthalate	2.33E-01 b	na	8.06E-01 b	na
87-68-3	Hexachlorobutadiene	5.70E+02 b	6.39E-03	1.19E+03 b	1.05E-02
87-86-5	Pentachlorophenol	1.42E+00 b	2.19E-03 d	4.44E+00 b	6.85E-03 d
88-06-2	2,4,6-Trichlorophenol	na	3.32E-04	na	3.68E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	9.87E+01 b	na	1.17E+02 b	na
91-20-3	Naphthalene	1.87E+02	na	1.87E+02	na
92-52-4	1,1'-Biphenyl	2.46E+00 b	na	3.06E+00 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.22E+00 b	na	1.35E+00 b	na
95-63-6	1,2,4-Trimethylbenzene	9.33E+01	na	9.36E+01	na
98-86-2	Acetophenone	1.45E+00 b	na	1.45E+00 b	na
98-95-3	Nitrobenzene	4.73E+02	na	4.75E+02	na
100-25-4	1,4-Dinitrobenzene (para-)	2.25E+03 b	na	2.26E+03 b	na
100-41-4	Ethyl benzene	8.53E-01	na	9.21E-01	na
100-42-5	Styrene	7.13E-01	na	7.38E-01	na
100-51-6	Benzyl alcohol	6.12E-01 b	na	6.13E-01 b	na
106-46-7	1,4-Dichlorobenzene (para-)	7.58E-01 a	1.12E-03 d	7.83E-01 a	1.24E-03 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	3.14E+03 a	1.59E+00	3.15E+03 a	1.62E+00
106-99-0	1,3-Butadiene	3.03E+02 a	7.79E-03 c	3.04E+02 a	7.81E-03 c
107-02-8	Acrolein	2.80E+04	na	2.80E+04	na
107-05-1	3-Chloropropene (Allyl chloride)	5.54E+02	na	5.54E+02	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	7.64E-03	na	7.65E-03
107-13-1	Acrylonitrile	3.80E+02	3.98E-02	3.80E+02	3.99E-02
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	2.15E-01 a	na	2.15E-01 a	na
108-67-8	1,3,5-Trimethylbenzene	9.33E+01	na	9.35E+01	na
108-87-2	Methyl cyclohexane	2.04E-01 a	na	2.13E-01 a	na
108-88-3	Toluene (Methyl benzene)	1.54E+00	na	1.55E+00	na
108-90-7	Chlorobenzene	2.94E+01	na	2.96E+01	na
108-94-1	Cyclohexanone	4.17E-02 b	na	4.18E-02 b	na
108-95-2	Phenol (Carbolic acid)	1.02E+00 b	na	1.02E+00 b	na
110-00-9	Furan (Oxacyclopentadiene)	1.16E+02 b	na	1.16E+02 b	na
110-54-3	n-Hexane	3.45E+00	na	3.88E+00	na
110-86-1	Pyridine	2.96E+02 b	na	2.96E+02 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	2.59E-01	na	2.60E-01	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	3.70E-01 b	na	3.70E-01 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	9.22E+01 b	1.11E-02 d	9.45E+01 b	1.13E-02 d

Table C3. Unit Factors for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	2.38E+02 b	na	2.39E+02 b	na
118-74-1	Hexachlorobenzene	1.74E+02 b	1.51E-01	1.00E+03 b	6.06E-01
120-82-1	1,2,4-Trichlorobenzene	5.94E+00	na	9.14E+00	na
121-44-8	Triethylamine	9.84E+01 a	na	9.84E+01 a	na
122-39-4	Diphenylamine	4.59E+00 b	na	5.28E+00 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.51E-03 d	na	1.51E-03 d
126-73-8	Tributyl Phosphate	3.38E-01 b	1.56E-04 d	3.85E-01 b	1.76E-04 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	1.51E+03	na	1.51E+03	na
127-18-4	1,1,2,2-Tetrachloroethylene	3.69E+00	7.54E-04	4.76E+00	9.92E-04
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.68E-01 b	na	1.69E-01 b	na
156-59-2	cis-1,2-Dichloroethylene	1.10E+01 b	na	1.11E+01 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	3.15E+00 b	na	9.28E+00 b	na
309-00-2	Aldrin	8.21E+03 b	2.38E+00	9.49E+04 b	2.13E+01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	3.54E-01	na	4.14E-01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	4.65E-02	na	6.33E-02
621-64-7	N-Nitrosodi-N-propylamine	na	1.09E+00 d	na	1.09E+00 d
1314-62-1	Vanadium pentoxide	3.77E+00 b	na	7.04E+00 b	na
1330-20-7	Xylenes (mixtures)	5.69E+00	na	5.72E+00	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.60E-01 d	na	6.56E+00 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	3.20E-02 d	na	1.31E+00 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	5.61E-03 d	na	2.30E-01 d
6533-73-9	Thallium carbonate	6.44E+02 b	na	1.68E+04 b	na
7429-90-5	Aluminum	1.11E+02	na	1.11E+02	na
7439-96-5	Manganese	1.11E+04 e	na	1.11E+04 e	na
7439-98-7	Molybdenum	5.43E+01 b	na	5.48E+01 b	na
7440-02-0	Nickel (soluble salts)	8.11E+00 b	na	8.93E+00 b	na
7440-22-4	Silver	2.32E+01 b	na	2.40E+01 b	na
7440-24-6	Strontium, Stable	4.85E-01 b	na	5.04E-01 b	na
7440-31-5	Tin	2.55E-01 b	na	9.05E-01 b	na
7440-36-0	Antimony	2.81E+02 b	na	3.32E+02 b	na
7440-38-2	Arsenic (inorganic)	3.77E+02 b	1.05E+00	4.93E+02 b	1.07E+00
7440-39-3	Barium	1.11E+03	na	1.11E+03	na
7440-41-7	Beryllium and compounds	2.78E+04	6.27E-01 c	2.78E+04	6.63E-01 c
7440-42-8	Boron and borates only	3.14E+01	na	3.14E+01	na
7440-43-9	Cadmium	2.73E+02 bf	4.28E-01 c	4.61E+02 bf	4.28E-01 c
7440-48-4	Cobalt	2.77E+04	7.80E-01 c	2.77E+04	8.67E-01 c
7440-66-6	Zinc and compounds	6.84E+01 b	na	6.85E+01 b	na
7487-94-7	Mercuric chloride	2.24E+03 b	na	2.68E+03 b	na
7664-41-7	Ammonia	1.80E+02 a	na	1.80E+02 a	na
7723-14-0	Phosphorus, white	1.14E+05 b	na	1.24E+05 b	na
7782-41-4	Fluorine (soluble fluoride)	3.16E+00 b	na	3.23E+00 b	na
7782-49-2	Selenium and compounds	2.90E+01 b	na	3.34E+01 b	na
8001-35-2	Toxaphene	na	4.61E-02	na	3.89E-01

Table C3. Unit Factors for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	6.30E-02 b	na	6.34E-02 b	na
14797-65-0	Nitrite	2.23E-01 b	na	2.29E-01 b	na
16065-83-1	Chromium (III) (insoluble salts)	2.81E-02 b	na	5.76E-02 b	na
18540-29-9	Chromium (VI) (soluble salts)	1.11E+01 g	8.89E-05 c	1.98E+01 g	8.89E-05 c
none	Uranium (soluble salts)	5.49E+01 b	na	5.92E+01 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the All Pathways Farmer is calculated using intakes from 30 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration. The “Well Water Only” columns assume all the contaminated water comes from a well. The “Columbia River” columns assume all the contaminated water comes from the Columbia River.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.

Table C4. Comparison Ratios for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	3.86		3.51	
57-12-5	Cyanide, free				
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	1.29	1.29	1.22	1.22
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	1.75			
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)	1.40		1.40	
67-66-3	Chloroform	3.55		3.48	
71-36-3	n-Butyl alcohol (n-Butanol)	1.27		1.27	
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)				
75-00-3	Ethyl Chloride				
75-01-4	Vinyl chloride (Chloroethylene)				
75-05-8	Acetonitrile	1.86		1.86	
75-07-0	Acetaldehyde	1.56	1.56	1.56	1.56
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane				
75-68-3	Chloro-1,1-difluoroethane, 1-	1.76		1.76	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor	2.11			
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	3.16		3.12	
79-01-6	Trichloroethylene	3.53		3.39	
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C4. Comparison Ratios for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	3.25	3.25	1.60	1.60
83-32-9	Acenaphthene	2.56		2.02	
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	3.28		1.50	
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	2.80		2.07	
95-50-1	1,2-Dichlorobenzene (ortho-)	3.58		2.89	
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone	1.30		1.30	
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)		3.63		2.90
106-93-4	1,2-Dibromoethane (Ethylene dibromide)				
106-99-0	1,3-Butadiene				
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)				
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane				
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone				
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	3.17		3.15	
110-54-3	n-Hexane				
110-86-1	Pyridine				
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				

Table C4. Comparison Ratios for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	2.32			
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	1.24		1.24	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)				
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	2.10		2.09	
156-59-2	cis-1,2-Dichloroethylene	3.55		3.49	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.29			
309-00-2	Aldrin	1.47			
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		1.74		
1336-36-3	Polychlorinated Biphenyls (low risk)		1.74		
1336-36-3	Polychlorinated Biphenyls (lowest risk)		1.74		
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum	1.41		1.41	
7440-02-0	Nickel (soluble salts)	1.95		1.80	
7440-22-4	Silver	3.15		2.94	
7440-24-6	Strontium, Stable	1.37		1.36	
7440-31-5	Tin	2.08			
7440-36-0	Antimony	3.39		2.48	
7440-38-2	Arsenic (inorganic)	3.33		2.15	
7440-39-3	Barium				
7440-41-7	Beryllium and compounds				
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	2.38		1.52	
7440-48-4	Cobalt				1.30
7440-66-6	Zinc and compounds				
7487-94-7	Mercuric chloride	1.70		1.53	
7664-41-7	Ammonia	231		231	
7723-14-0	Phosphorus, white				
7782-41-4	Fluorine (soluble fluoride)	1.72		1.69	
7782-49-2	Selenium and compounds	2.21		1.90	
8001-35-2	Toxaphene				

Table C4. Comparison Ratios for the All Pathways Farmer Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	4.67		4.57	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C3 divided by the unit factors in Table 15.
- Ratios less than 1.2 are not listed.

Table C5. Unit Factors for the Native American Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	1.04E+01 d	na	6.14E+02 d
53-70-3	Dibenz[a,h]anthracene	na	2.26E+01	na	1.81E+03
56-23-5	Carbon tetrachloride	2.61E+02 b	2.09E-02	6.01E+02 b	5.19E-02
57-12-5	Cyanide, free	2.99E+03 b	na	3.06E+03 b	na
57-14-7	1,1-Dimethylhydrazine	na	3.85E+01	na	3.86E+01
57-55-6	Propylene glycol (1,2-Propanediol)	2.04E-01 b	na	2.06E-01 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	7.64E+02 b	2.98E-01 d	5.14E+03 b	1.96E+00 d
60-34-4	Methylhydrazine	na	2.88E+01	na	2.89E+01
60-57-1	Dieldrin	3.79E+03 b	3.75E+00	4.56E+05 b	3.64E+02
62-75-9	N-Nitrosodimethylamine	na	3.09E+02	na	3.10E+02
64-18-6	Formic acid	1.72E+00 b	na	1.74E+00 b	na
67-56-1	Methanol (Methyl alcohol)	4.38E+00 b	na	4.44E+00 b	na
67-64-1	Acetone (2-Propanone)	7.89E+00 b	na	8.16E+00 b	na
67-66-3	Chloroform	1.96E+01 b	1.81E-02	2.55E+01 b	1.81E-02
71-36-3	n-Butyl alcohol (n-Butanol)	3.83E+00 b	na	4.13E+00 b	na
71-43-2	Benzene	4.62E+01	1.05E-02	6.40E+01	1.44E-02
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	7.00E-01	na	1.35E+00	na
72-20-8	Endrin	2.74E+03 b	na	7.72E+04 b	na
74-83-9	Bromomethane	2.24E+02	na	2.34E+02	na
74-87-3	Methyl chloride (Chloromethane)	1.08E+01 a	na	1.13E+01 a	na
75-00-3	Ethyl Chloride	9.26E-02 a	na	9.63E-02 a	na
75-01-4	Vinyl chloride (Chloroethylene)	3.40E+01	1.17E-01	4.38E+01	1.58E-01
75-05-8	Acetonitrile	4.05E+01 a	na	4.13E+01 a	na
75-07-0	Acetaldehyde	2.05E+02 a	4.06E-03 c	2.10E+02 a	4.16E-03 c
75-09-2	Dichloromethane (Methylene chloride)	1.86E+00	1.09E-03	2.12E+00	1.20E-03
75-15-0	Carbon disulfide	1.87E+00	na	2.46E+00	na
75-21-8	Ethylene Oxide (Oxirane)	na	5.58E-01	na	5.83E-01
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	2.34E+00	na	2.73E+00	na
75-35-4	1,1-Dichloroethylene	5.33E+00	na	6.73E+00	na
75-45-6	Chlorodifluoromethane	1.90E-02 a	na	1.94E-02 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	4.87E-02 a	na	5.43E-02 a	na
75-69-4	Trichlorofluoromethane	1.40E+00	na	1.89E+00	na
75-71-8	Dichlorodifluoromethane	4.31E+00	na	4.71E+00	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	2.83E-02	na	4.24E-02	na
76-44-8	Heptachlor	6.93E+02 b	2.07E+00	1.55E+05 b	3.48E+02
78-87-5	1,2-Dichloropropane	1.96E+02 a	na	1.96E+02 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	1.48E+00	na	1.53E+00	na
79-00-5	1,1,2-Trichloroethane	5.26E+01 b	1.81E-02	6.43E+01 b	2.08E-02
79-01-6	Trichloroethylene	3.45E+01 b	2.38E-03	5.60E+01 b	3.79E-03
79-10-7	2-Propenoic acid (Acrylic acid)	1.34E+01	na	1.34E+01	na

Table C5. Unit Factors for the Native American Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	6.52E-02	na	8.75E-02
82-68-8	Pentachloronitrobenzene (PCNB)	7.23E+01 b	5.64E-02 d	2.03E+03 b	1.57E+00 d
83-32-9	Acenaphthene	5.50E+00 b	na	3.46E+01 b	na
84-66-2	Diethyl phthalate	3.83E-01 b	na	5.73E-01 b	na
84-74-2	Dibutyl phthalate	1.22E+00 b	na	4.74E+01 b	na
85-68-7	Butyl benzyl phthalate	8.08E-01 b	na	3.70E+01 b	na
87-68-3	Hexachlorobutadiene	1.20E+03 b	2.72E-02	3.83E+04 b	6.06E-01
87-86-5	Pentachlorophenol	5.14E+00 b	1.85E-02 d	1.93E+02 b	6.89E-01 d
88-06-2	2,4,6-Trichlorophenol	na	2.33E-03	na	8.34E-03
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	6.27E+02 b	na	3.17E+03 b	na
91-20-3	Naphthalene	2.66E+02	na	2.94E+02	na
92-52-4	1,1'-Biphenyl	5.66E+00 b	na	4.32E+01 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	2.24E+00 b	na	9.88E+00 b	na
95-63-6	1,2,4-Trimethylbenzene	1.33E+02	na	1.52E+02	na
98-86-2	Acetophenone	4.17E+00 b	na	4.34E+00 b	na
98-95-3	Nitrobenzene	1.05E+03	na	1.16E+03	na
100-25-4	1,4-Dinitrobenzene (para-)	1.29E+04 b	na	1.42E+04 b	na
100-41-4	Ethyl benzene	1.64E+00	na	5.86E+00	na
100-42-5	Styrene	1.24E+00	na	2.74E+00	na
100-51-6	Benzyl alcohol	2.09E+00 b	na	2.14E+00 b	na
106-46-7	1,4-Dichlorobenzene (para-)	1.16E+00 a	4.75E-03 d	2.69E+00 a	2.15E-02 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	4.94E+03 a	1.02E+01	5.41E+03 a	1.47E+01
106-99-0	1,3-Butadiene	4.57E+02 a	2.74E-02 c	5.07E+02 a	3.04E-02 c
107-02-8	Acrolein	3.99E+04	na	3.99E+04	na
107-05-1	3-Chloropropene (Allyl chloride)	7.82E+02	na	7.83E+02	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	2.95E-02	na	3.16E-02
107-13-1	Acrylonitrile	7.24E+02	2.33E-01	7.50E+02	2.47E-01
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	3.48E-01 a	na	3.59E-01 a	na
108-67-8	1,3,5-Trimethylbenzene	1.32E+02	na	1.46E+02	na
108-87-2	Methyl cyclohexane	3.31E-01 a	na	8.90E-01 a	na
108-88-3	Toluene (Methyl benzene)	2.37E+00	na	3.39E+00	na
108-90-7	Chlorobenzene	4.44E+01	na	5.73E+01	na
108-94-1	Cyclohexanone	1.30E-01 b	na	1.37E-01 b	na
108-95-2	Phenol (Carbolic acid)	3.72E+00 b	na	3.96E+00 b	na
110-00-9	Furan (Oxacyclopentadiene)	2.10E+02 b	na	2.29E+02 b	na
110-54-3	n-Hexane	6.86E+00	na	3.37E+01	na
110-86-1	Pyridine	9.53E+02 b	na	9.89E+02 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	8.59E-01	na	9.20E-01	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	1.31E+00 b	na	1.33E+00 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	4.14E+02 b	1.16E-01 d	8.81E+02 b	2.32E-01 d

Table C5. Unit Factors for the Native American Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	8.93E+02 b	na	1.48E+03 b	na
118-74-1	Hexachlorobenzene	5.20E+02 b	8.47E-01	5.04E+04 b	6.47E+01
120-82-1	1,2,4-Trichlorobenzene	1.36E+01	na	2.08E+02	na
121-44-8	Triethylamine	1.72E+02 a	na	1.79E+02 a	na
122-39-4	Diphenylamine	2.72E+01 b	na	1.19E+02 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.19E-02 d	na	1.22E-02 d
126-73-8	Tributyl Phosphate	1.90E+00 b	2.04E-03 d	1.11E+01 b	9.63E-03 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	3.34E+03	na	3.61E+03	na
127-18-4	1,1,2,2-Tetrachloroethylene	8.62E+00	4.26E-03	7.32E+01	3.78E-02
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	3.74E-01 b	na	4.04E-01 b	na
156-59-2	cis-1,2-Dichloroethylene	1.91E+01 b	na	2.35E+01 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.60E+01 b	na	4.09E+02 b	na
309-00-2	Aldrin	2.61E+04 b	1.52E+01	5.25E+06 b	2.68E+03
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	1.82E+00	na	1.08E+01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	3.86E-01	na	2.96E+00
621-64-7	N-Nitrosodi-N-propylamine	na	9.02E+00 d	na	9.60E+00 d
1314-62-1	Vanadium pentoxide	1.18E+01 b	na	3.14E+02 b	na
1330-20-7	Xylenes (mixtures)	8.24E+00	na	1.02E+01	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.15E+00 d	na	8.96E+02 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	2.29E-01 d	na	1.79E+02 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	4.01E-02 d	na	3.14E+01 d
6533-73-9	Thallium carbonate	1.73E+03 b	na	9.89E+05 b	na
7429-90-5	Aluminum	1.56E+02	na	1.61E+02	na
7439-96-5	Manganese	1.56E+04 e	na	1.57E+04 e	na
7439-98-7	Molybdenum	2.23E+02 b	na	3.04E+02 b	na
7440-02-0	Nickel (soluble salts)	3.04E+01 b	na	1.24E+02 b	na
7440-22-4	Silver	4.03E+01 b	na	2.62E+02 b	na
7440-24-6	Strontium, Stable	2.55E+00 b	na	5.13E+00 b	na
7440-31-5	Tin	5.04E-01 b	na	4.14E+01 b	na
7440-36-0	Antimony	5.84E+02 b	na	1.11E+04 b	na
7440-38-2	Arsenic (inorganic)	6.78E+02 b	3.51E+00	1.03E+04 b	7.73E+00
7440-39-3	Barium	1.56E+03	na	1.58E+03	na
7440-41-7	Beryllium and compounds	3.92E+04	2.29E+00 c	4.23E+04	1.83E+01 c
7440-42-8	Boron and borates only	5.55E+01	na	5.75E+01	na
7440-43-9	Cadmium	1.04E+03 bf	1.41E+00 c	8.70E+04 bf	1.41E+00 c
7440-48-4	Cobalt	3.91E+04	3.14E+00 c	3.93E+04	1.84E+01 c
7440-66-6	Zinc and compounds	3.37E+02 b	na	3.47E+02 b	na
7487-94-7	Mercuric chloride	4.51E+03 b	na	3.22E+04 b	na
7664-41-7	Ammonia	6.70E+02 a	na	6.71E+02 a	na
7723-14-0	Phosphorus, white	5.41E+05 b	na	1.14E+06 b	na
7782-41-4	Fluorine (soluble fluoride)	6.23E+00 b	na	2.26E+01 b	na
7782-49-2	Selenium and compounds	4.90E+01 b	na	3.80E+02 b	na
8001-35-2	Toxaphene	na	2.93E-01	na	4.90E+01

Table C5. Unit Factors for the Native American Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	9.72E-02 b	na	1.34E-01 b	na
14797-65-0	Nitrite	4.49E-01 b	na	1.04E+00 b	na
16065-83-1	Chromium (III) (insoluble salts)	1.16E-01 b	na	7.15E+00 b	na
18540-29-9	Chromium (VI) (soluble salts)	8.06E+02 g	7.53E-02 c	1.36E+03 g	7.53E-02 c
none	Uranium (soluble salts)	1.37E+02 b	na	7.55E+02 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the Native American is calculated using intakes from 70 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration. The "Well Water" columns assume all the contaminated water comes from the well. The "Columbia River" columns assume all contaminated water comes from the Columbia River.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.

Table C6. Unit Factor Ratios for the Native American Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	2.57		1.36	
57-12-5	Cyanide, free				
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)				
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	1.32			
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)				
67-66-3	Chloroform	2.32		1.78	
71-36-3	n-Butyl alcohol (n-Butanol)				
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)	1.24		1.30	
75-00-3	Ethyl Chloride			1.23	
75-01-4	Vinyl chloride (Chloroethylene)				
75-05-8	Acetonitrile	3.10		3.16	
75-07-0	Acetaldehyde	2.36	2.36	2.42	2.42
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane	1.22		1.24	
75-68-3	Chloro-1,1-difluoroethane, 1-	3.12		3.48	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor	1.47			
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	2.13		1.77	
79-01-6	Trichloroethylene	2.17		1.50	
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C6. Unit Factor Ratios for the Native American Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	2.06	2.06		
83-32-9	Acenaphthene	1.51			
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	1.87			
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	1.65			
95-50-1	1,2-Dichlorobenzene (ortho-)	2.25			
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone				
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)		2.29	2.76	
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.26		1.38	
106-99-0	1,3-Butadiene			1.30	1.30
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.34		1.38	
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane	1.27		3.42	
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone				
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	2.13		1.95	
110-54-3	n-Hexane				
110-86-1	Pyridine				
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				

Table C6. Unit Factor Ratios for the Native American Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	1.37			
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	1.54		1.60	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)				
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.50		1.44	
156-59-2	cis-1,2-Dichloroethylene	2.41		1.91	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)				
309-00-2	Aldrin				
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		1.24		
1336-36-3	Polychlorinated Biphenyls (low risk)		1.24		
1336-36-3	Polychlorinated Biphenyls (lowest risk)		1.24		
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum				
7440-02-0	Nickel (soluble salts)	1.22			
7440-22-4	Silver	2.24			
7440-24-6	Strontium, Stable				
7440-31-5	Tin	1.58			
7440-36-0	Antimony	1.91			
7440-38-2	Arsenic (inorganic)	2.22			
7440-39-3	Barium				
7440-41-7	Beryllium and compounds		1.22		9.76
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	1.27			
7440-48-4	Cobalt		1.44		8.40
7440-66-6	Zinc and compounds				
7487-94-7	Mercuric chloride	1.41			
7664-41-7	Ammonia	608		609	
7723-14-0	Phosphorus, white				
7782-41-4	Fluorine (soluble fluoride)	1.43			
7782-49-2	Selenium and compounds	1.84			
8001-35-2	Toxaphene				

Table C6. Unit Factor Ratios for the Native American Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	3.54		2.08	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C5 divided by the unit factors in Table 18.
- Ratios less than 1.2 are not listed.

Table C7. Unit Factors: Columbia River Population & HSRAm Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAm Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	1.01E+07 d	na	2.95E-01 d
53-70-3	Dibenz[a,h]anthracene	na	2.44E+07	na	5.42E-01
56-23-5	Carbon tetrachloride	7.84E+08 b	6.14E+04	8.62E+01 b	1.89E-03
57-12-5	Cyanide, free	6.50E+09 b	na	2.98E+00 b	na
57-14-7	1,1-Dimethylhydrazine	na	8.35E+07	na	9.79E-03
57-55-6	Propylene glycol (1,2-Propanediol)	4.43E+05 b	na	4.90E-04 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	1.81E+09 b	7.02E+05 d	6.91E+01 b	7.70E-03 d
60-34-4	Methylhydrazine	na	6.24E+07	na	9.04E-03
60-57-1	Dieldrin	8.80E+09 b	9.58E+06	6.83E+02 b	2.49E-01
62-75-9	N-Nitrosodimethylamine	na	6.71E+08	na	2.46E-01
64-18-6	Formic acid	3.73E+06 b	na	5.08E-03 b	na
67-56-1	Methanol (Methyl alcohol)	9.59E+06 b	na	3.80E-02 b	na
67-64-1	Acetone (2-Propanone)	1.88E+07 b	na	5.92E-01 b	na
67-66-3	Chloroform	5.75E+07 b	6.39E+04	6.06E+00 b	2.28E-03
71-36-3	n-Butyl alcohol (n-Butanol)	8.98E+06 b	na	2.78E-01 b	na
71-43-2	Benzene	1.37E+08	3.15E+04	1.42E+01	9.35E-04
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	2.04E+06	na	2.09E-01	na
72-20-8	Endrin	3.04E+09 b	na	3.21E+02 b	na
74-83-9	Bromomethane	7.09E+08	na	7.62E+01	na
74-87-3	Methyl chloride (Chloromethane)	3.55E+07 a	na	4.04E+00 a	na
75-00-3	Ethyl Chloride	3.10E+05 a	na	3.63E-02 a	na
75-01-4	Vinyl chloride (Chloroethylene)	8.74E+07	2.75E+05	6.84E+00	2.47E-03 h
75-05-8	Acetonitrile	1.06E+08 a	na	6.07E+00 a	na
75-07-0	Acetaldehyde	5.67E+08 a	1.12E+04 c	4.04E+01 a	2.28E-04 c
75-09-2	Dichloromethane (Methylene chloride)	4.59E+06	2.96E+03	2.81E-01	6.79E-05
75-15-0	Carbon disulfide	5.62E+06	na	6.00E-01	na
75-21-8	Ethylene Oxide (Oxirane)	na	1.33E+06	na	1.27E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	7.34E+06	na	7.92E-01	na
75-35-4	1,1-Dichloroethylene	1.71E+07	na	1.94E+00	na
75-45-6	Chlorodifluoromethane	6.31E+04 a	na	7.26E-03 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	1.27E+05 a	na	7.27E-03 a	na
75-69-4	Trichlorofluoromethane	4.50E+06	na	5.35E-01	na
75-71-8	Dichlorodifluoromethane	1.47E+07	na	1.79E+00	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	9.74E+04	na	1.19E-02	na
76-44-8	Heptachlor	1.57E+09 b	5.34E+06	1.38E+02 b	1.54E-01
78-87-5	1,2-Dichloropropane	6.95E+08 a	na	8.67E+01 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	4.31E+06	na	3.62E-01	na
79-00-5	1,1,2-Trichloroethane	1.55E+08 b	5.72E+04	1.49E+01 b	1.74E-03
79-01-6	Trichloroethylene	9.52E+07 b	6.64E+03	1.04E+01 b	2.10E-04
79-10-7	2-Propenoic acid (Acrylic acid)	4.53E+07	na	5.25E+00	na

Table C7. Unit Factors: Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	2.06E+05	na	6.31E-03
82-68-8	Pentachloronitrobenzene (PCNB)	2.03E+08 b	1.58E+05 d	2.06E+01 b	4.58E-03 d
83-32-9	Acenaphthene	1.17E+07 b	na	1.22E+00 b	na
84-66-2	Diethyl phthalate	8.51E+05 b	na	1.40E-02 b	na
84-74-2	Dibutyl phthalate	2.66E+06 b	na	1.55E-01 b	na
85-68-7	Butyl benzyl phthalate	1.72E+06 b	na	7.67E-02 b	na
87-68-3	Hexachlorobutadiene	2.92E+09 b	7.57E+04	3.36E+02 b	2.57E-03
87-86-5	Pentachlorophenol	8.89E+06 b	3.18E+04 d	5.44E-01 b	5.59E-04 d
88-06-2	2,4,6-Trichlorophenol	na	5.11E+03	na	7.39E-05
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1.40E+09 b	na	1.23E+01 b	na
91-20-3	Naphthalene	9.36E+08	na	1.16E+02	na
92-52-4	1,1'-Biphenyl	1.31E+07 b	na	1.38E+00 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	6.32E+06 b	na	6.88E-01 b	na
95-63-6	1,2,4-Trimethylbenzene	4.67E+08	na	5.81E+01	na
98-86-2	Acetophenone	9.82E+06 b	na	3.10E-01 b	na
98-95-3	Nitrobenzene	2.82E+09	na	1.90E+02	na
100-25-4	1,4-Dinitrobenzene (para-)	2.81E+10 b	na	2.70E+01 b	na
100-41-4	Ethyl benzene	4.44E+06	na	4.68E-01	na
100-42-5	Styrene	3.68E+06	na	4.06E-01	na
100-51-6	Benzyl alcohol	4.58E+06 b	na	3.53E-02 b	na
106-46-7	1,4-Dichlorobenzene (para-)	3.83E+06 a	1.36E+04 d	4.58E-01 a	4.23E-04 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.62E+10 a	2.34E+07	1.82E+03 a	2.63E-01
106-99-0	1,3-Butadiene	1.53E+09 a	9.19E+04 c	1.82E+02 a	3.13E-03 c
107-02-8	Acrolein	1.40E+11	na	1.73E+04	na
107-05-1	3-Chloropropene (Allyl chloride)	2.77E+09	na	3.46E+02	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	9.31E+04	na	2.83E-03
107-13-1	Acrylonitrile	2.12E+09	5.86E+05	1.83E+02	8.24E-03
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.12E+06 a	na	1.21E-01 a	na
108-67-8	1,3,5-Trimethylbenzene	4.67E+08	na	5.81E+01	na
108-87-2	Methyl cyclohexane	1.03E+06 a	na	1.25E-01 a	na
108-88-3	Toluene (Methyl benzene)	7.78E+06	na	9.25E-01	na
108-90-7	Chlorobenzene	1.48E+08	na	1.80E+01	na
108-94-1	Cyclohexanone	2.97E+05 b	na	5.61E-03 b	na
108-95-2	Phenol (Carbolic acid)	8.12E+06 b	na	3.57E-02 b	na
110-00-9	Furan (Oxacyclopentadiene)	6.20E+08 b	na	5.95E+01 b	na
110-54-3	n-Hexane	1.75E+07	na	2.12E+00	na
110-86-1	Pyridine	2.15E+09 b	na	3.21E+01 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	1.89E+06	na	2.15E-02	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	2.85E+06 b	na	4.90E-03 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	6.35E+08 b	1.77E+05 d	1.74E+01 b	1.39E-03 d

Table C7. Unit Factors: Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	1.70E+09 b	na	8.84E+00 b	na
118-74-1	Hexachlorobenzene	8.98E+08 b	1.79E+06	1.07E+02 b	6.21E-02
120-82-1	1,2,4-Trichlorobenzene	3.16E+07	na	3.07E+00	na
121-44-8	Triethylamine	5.30E+08 a	na	5.19E+01 a	na
122-39-4	Diphenylamine	6.02E+07 b	na	8.12E-01 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	2.63E+04 d	na	6.13E-05 d
126-73-8	Tributyl Phosphate	4.25E+06 b	4.50E+03 d	6.14E-02 b	1.89E-05 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	8.92E+09	na	5.93E+02	na
127-18-4	1,1,2,2-Tetrachloroethylene	1.98E+07	9.49E+03	1.71E+00	2.26E-04
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	9.97E+05 b	na	6.59E-02 b	na
156-59-2	cis-1,2-Dichloroethylene	5.77E+07 b	na	5.95E+00 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.91E+07 b	na	2.05E+00 b	na
309-00-2	Aldrin	4.77E+10 b	3.11E+07	2.99E+03 b	6.82E-01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	4.97E+06	na	1.07E-01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	8.68E+05	na	6.31E-03
621-64-7	N-Nitrosodi-N-propylamine	na	1.99E+07 d	na	4.22E-02 d
1314-62-1	Vanadium pentoxide	2.83E+07 b	na	1.45E+00 b	na
1330-20-7	Xylenes (mixtures)	2.85E+07	na	3.52E+00	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	9.80E+05 di	na	5.30E-02 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	2.94E+05 di	na	1.06E-02 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	3.92E+04 di	na	1.86E-03 d
6533-73-9	Thallium carbonate	5.10E+09 b	na	1.24E+02 b	na
7429-90-5	Aluminum	5.54E+08	na	6.91E+01	na
7439-96-5	Manganese	5.54E+10 e	na	6.91E+03 e	na
7439-98-7	Molybdenum	4.97E+08 b	na	1.19E+01 b	na
7440-02-0	Nickel (soluble salts)	5.83E+07 b	na	2.97E+00 b	na
7440-22-4	Silver	1.34E+08 b	na	1.19E+01 b	na
7440-24-6	Strontium, Stable	5.47E+06 b	na	9.91E-02 b	na
7440-31-5	Tin	1.62E+06 b	na	1.00E-01 b	na
7440-36-0	Antimony	1.80E+09 b	na	1.53E+02 b	na
7440-38-2	Arsenic (inorganic)	2.21E+09 b	1.24E+07	1.98E+02 b	4.31E-01
7440-39-3	Barium	5.54E+09	na	6.91E+02	na
7440-41-7	Beryllium and compounds	1.39E+11	7.61E+06 c	1.73E+04	2.52E-01 c
7440-42-8	Boron and borates only	1.73E+08	na	1.74E+01	na
7440-43-9	Cadmium	3.45E+09 bf	4.99E+06 c	1.25E+02 bf	1.78E-01 c
7440-48-4	Cobalt	1.39E+11	1.03E+07 c	1.73E+04	2.91E-01 c
7440-66-6	Zinc and compounds	7.31E+08 b	na	1.98E-01 b	na
7487-94-7	Mercuric chloride	1.44E+10 b	na	6.09E+02 b	na
7664-41-7	Ammonia	1.45E+09 a	na	6.59E-01 a	na
7723-14-0	Phosphorus, white	9.69E+11 b	na	2.97E+03 b	na
7782-41-4	Fluorine (soluble fluoride)	2.06E+07 b	na	9.89E-01 b	na
7782-49-2	Selenium and compounds	1.48E+08 b	na	1.19E+01 b	na
8001-35-2	Toxaphene	na	6.73E+05	na	1.24E-02

Table C7. Unit Factors: Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	3.16E+05 b	na	3.71E-02 b	na
14797-65-0	Nitrite	1.13E+06 b	na	1.03E-01 b	na
16065-83-1	Chromium (III) (insoluble salts)	2.93E+05 b	na	1.12E-02 b	na
18540-29-9	Chromium (VI) (soluble salts)	5.83E+07 g	6.91E+02 c	4.32E+00 g	2.70E-05 c
none	Uranium (soluble salts)	3.47E+08 b	na	1.65E+01 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the population along the Columbia River (5 million people) is calculated using intakes from 70 consecutive years. The soil concentration is zero at the start of the exposure.
- The total risk to the worker is calculated using intakes from 20 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.
 - (h) -- Vinyl chloride (75-01-4) uses slope factors from IRIS for adulthood only exposures.
 - (i) -- PCBs (1336-36-3) use the central estimate slope factors from IRIS for a population.

Table C8. Comparison Ratios for the Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	3.59		5.53	
57-12-5	Cyanide, free			5.87	
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)			2.00	2.00
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	1.58		2.45	
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)			1.94	
67-64-1	Acetone (2-Propanone)	1.27		6.04	
67-66-3	Chloroform	3.22		5.39	
71-36-3	n-Butyl alcohol (n-Butanol)			2.78	
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)				
75-00-3	Ethyl Chloride				
75-01-4	Vinyl chloride (Chloroethene)				
75-05-8	Acetonitrile	2.29			
75-07-0	Acetaldehyde	1.84	1.84		
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane				
75-68-3	Chloro-1,1-difluoroethane, 1-	2.30			
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor	2.02		3.51	
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	2.76		5.92	
79-01-6	Trichloroethylene	3.26		4.74	
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C8. Comparison Ratios for the Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	2.87	2.87	5.03	5.03
83-32-9	Acenaphthene	2.30		3.07	
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate			1.31	
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	3.10		3.79	
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	2.52		3.55	
95-50-1	1,2-Dichlorobenzene (ortho-)	3.29		4.96	
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone	1.21		3.10	
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)		3.35		5.04
106-93-4	1,2-Dibromoethane (Ethylene dibromide)				
106-99-0	1,3-Butadiene				
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.21			
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane				
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone			2.84	
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	2.77		5.91	
110-54-3	n-Hexane				
110-86-1	Pyridine			3.24	
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				

Table C8. Comparison Ratios for the Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	2.23		2.35	
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	1.34			
122-39-4	Diphenylamine			1.51	
123-91-1	1,4-Dioxane (Diethylene oxide)				1.99
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.79		6.01	
156-59-2	cis-1,2-Dichloroethylene	3.18		5.88	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.23		1.28	
309-00-2	Aldrin	1.38		2.22	
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				2.06
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		1.68		2.14
1336-36-3	Polychlorinated Biphenyls (low risk)		1.68		2.14
1336-36-3	Polychlorinated Biphenyls (lowest risk)		1.68		2.14
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum			5.97	
7440-02-0	Nickel (soluble salts)	1.51		5.97	
7440-22-4	Silver	2.44		5.93	
7440-24-6	Strontium, Stable			5.92	
7440-31-5	Tin	1.69		5.55	
7440-36-0	Antimony	2.22		5.19	
7440-38-2	Arsenic (inorganic)	2.48		5.92	
7440-39-3	Barium				
7440-41-7	Beryllium and compounds				
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	1.30		4.78	
7440-48-4	Cobalt		1.32		
7440-66-6	Zinc and compounds			5.96	
7487-94-7	Mercuric chloride	1.47		18.43	
7664-41-7	Ammonia	372		1.35	
7723-14-0	Phosphorus, white			5.94	
7782-41-4	Fluorine (soluble fluoride)	1.47		5.97	

Table C8. Comparison Ratios for the Columbia River Population & HSRAM Industrial Scenarios.

CASRN	Chemical Name	Columbia River Population		HSRAM Industrial	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
7782-49-2	Selenium and compounds	2.16		5.98	
8001-35-2	Toxaphene				
14797-55-8	Nitrate	4.62		5.99	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C7 divided by the unit factors in Tables 21 and 23.
- Ratios less than 1.2 are not listed.

Table C9. Unit Factors for the HSRAM Recreational Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	1.32E-02 d	na	1.29E+01 d
53-70-3	Dibenz[a,h]anthracene	na	2.37E-02	na	3.85E+01
56-23-5	Carbon tetrachloride	1.80E+00 b	3.29E-05	1.92E+01 b	7.11E-04
57-12-5	Cyanide, free	6.34E-02 b	na	2.80E-01 b	na
57-14-7	1,1-Dimethylhydrazine	na	7.09E-04	na	2.35E-03
57-55-6	Propylene glycol (1,2-Propanediol)	6.01E-05 b	na	1.23E-04 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	4.15E+00 b	3.22E-04 d	1.97E+02 b	3.23E-02 d
60-34-4	Methylhydrazine	na	7.08E-04	na	2.34E-03
60-57-1	Dieldrin	2.70E+01 b	4.73E-03	2.23E+04 b	7.65E+00
62-75-9	N-Nitrosodimethylamine	na	1.21E-02	na	4.02E-02
64-18-6	Formic acid	6.02E-04 b	na	1.24E-03 b	na
67-56-1	Methanol (Methyl alcohol)	2.41E-03 b	na	4.91E-03 b	na
67-64-1	Acetone (2-Propanone)	1.23E-02 b	na	2.48E-02 b	na
67-66-3	Chloroform	1.27E-01 b	1.18E-06	4.45E-01 b	2.55E-06
71-36-3	n-Butyl alcohol (n-Butanol)	1.22E-02 b	na	2.55E-02 b	na
71-43-2	Benzene	3.12E-01	1.37E-05	1.23E+00	1.01E-04
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	6.18E-03	na	3.95E-02	na
72-20-8	Endrin	1.11E+01 b	na	2.74E+03 b	na
74-83-9	Bromomethane	9.01E-01	na	1.40E+00	na
74-87-3	Methyl chloride (Chloromethane)	2.57E-02 a	na	5.11E-02 a	na
75-00-3	Ethyl Chloride	2.32E-04 a	na	4.28E-04 a	na
75-01-4	Vinyl chloride (Chloroethylene)	4.05E-01	3.35E-04	9.15E-01	1.25E-03
75-05-8	Acetonitrile	3.86E-02 a	na	7.51E-02 a	na
75-07-0	Acetaldehyde	2.56E-01 a	9.95E-07 c	4.98E-01 a	3.04E-06 c
75-09-2	Dichloromethane (Methylene chloride)	2.01E-02	1.79E-06	3.31E-02	4.30E-06
75-15-0	Carbon disulfide	1.25E-02	na	4.02E-02	na
75-21-8	Ethylene Oxide (Oxirane)	na	2.44E-04	na	7.86E-04
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.25E-02	na	3.23E-02	na
75-35-4	1,1-Dichloroethylene	2.53E-02	na	9.74E-02	na
75-45-6	Chlorodifluoromethane	4.62E-05 a	na	6.67E-05 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	4.74E-05 a	na	1.79E-04 a	na
75-69-4	Trichlorofluoromethane	4.52E-03	na	3.10E-02	na
75-71-8	Dichlorodifluoromethane	7.27E-03	na	2.88E-02	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	4.78E-05	na	7.61E-04	na
76-44-8	Heptachlor	3.06E+00 b	1.67E-03	7.71E+03 b	7.43E+00
78-87-5	1,2-Dichloropropane	5.58E-02 a	na	6.51E-02 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	2.21E-03	na	4.30E-03	na
79-00-5	1,1,2-Trichloroethane	3.09E-01 b	1.42E-05	8.92E-01 b	7.10E-05
79-01-6	Trichloroethylene	2.21E-01 b	3.11E-06	1.41E+00 b	3.68E-05
79-10-7	2-Propenoic acid (Acrylic acid)	5.56E-03	na	8.14E-03	na

Table C9. Unit Factors for the HSRAm Recreational Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	5.04E-05	na	5.26E-04
82-68-8	Pentachloronitrobenzene (PCNB)	4.39E-01 b	7.12E-05 d	9.73E+01 b	3.24E-02 d
83-32-9	Acenaphthene	2.73E-02 b	na	1.48E+00 b	na
84-66-2	Diethyl phthalate	1.53E-03 b	na	8.98E-03 b	na
84-74-2	Dibutyl phthalate	1.28E-02 b	na	2.28E+00 b	na
85-68-7	Butyl benzyl phthalate	6.55E-03 b	na	1.72E+00 b	na
87-68-3	Hexachlorobutadiene	7.26E+00 b	2.66E-05	1.88E+03 b	1.25E-02
87-86-5	Pentachlorophenol	4.68E-02 b	3.81E-05 d	9.17E+00 b	1.41E-02 d
88-06-2	2,4,6-Trichlorophenol	na	3.08E-06	na	1.13E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1.27E+00 b	na	4.85E+01 b	na
91-20-3	Naphthalene	1.33E-01	na	1.54E+00	na
92-52-4	1,1'-Biphenyl	3.03E-02 b	na	1.91E+00 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.45E-02 b	na	4.04E-01 b	na
95-63-6	1,2,4-Trimethylbenzene	6.16E-02	na	1.07E+00	na
98-86-2	Acetophenone	1.22E-02 b	na	1.57E-02 b	na
98-95-3	Nitrobenzene	2.53E+00	na	7.05E+00	na
100-25-4	1,4-Dinitrobenzene (para-)	3.08E+00 b	na	1.10E+01 b	na
100-41-4	Ethyl benzene	1.29E-02	na	2.30E-01	na
100-42-5	Styrene	6.52E-03	na	8.37E-02	na
100-51-6	Benzyl alcohol	4.03E-03 b	na	4.85E-03 b	na
106-46-7	1,4-Dichlorobenzene (para-)	3.03E-03 a	6.48E-06 d	8.06E-02 a	3.72E-04 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.16E+01 a	2.01E-02	3.41E+01 a	1.14E-01
106-99-0	1,3-Butadiene	1.18E+00 a	1.41E-05 c	3.85E+00 a	8.27E-05 c
107-02-8	Acrolein	1.27E+01	na	1.52E+01	na
107-05-1	3-Chloropropene (Allyl chloride)	2.31E-01	na	2.84E-01	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	2.26E-05	na	6.73E-05
107-13-1	Acrylonitrile	1.30E+00	1.30E-04	2.56E+00	4.20E-04
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	7.72E-04 a	na	1.28E-03 a	na
108-67-8	1,3,5-Trimethylbenzene	6.07E-02	na	7.59E-01	na
108-87-2	Methyl cyclohexane	8.86E-04 a	na	2.99E-02 a	na
108-88-3	Toluene (Methyl benzene)	6.78E-03	na	5.97E-02	na
108-90-7	Chlorobenzene	7.64E-02	na	7.65E-01	na
108-94-1	Cyclohexanone	2.43E-04 b	na	5.03E-04 b	na
108-95-2	Phenol (Carbolic acid)	4.08E-03 b	na	8.86E-03 b	na
110-00-9	Furan (Oxacyclopentadiene)	1.24E+00 b	na	2.19E+00 b	na
110-54-3	n-Hexane	2.74E-02	na	1.42E+00	na
110-86-1	Pyridine	1.22E+00 b	na	2.55E+00 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	2.41E-03	na	5.00E-03	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	6.01E-04 b	na	1.23E-03 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	5.35E-01 b	6.03E-05 d	1.41E+01 b	1.68E-03 d

Table C9. Unit Factors for the HSRAm Recreational Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	2.88E-01 b	na	5.22E+00 b	na
118-74-1	Hexachlorobenzene	2.48E+00 b	9.09E-04	2.51E+03 b	1.38E+00
120-82-1	1,2,4-Trichlorobenzene	1.31E-01	na	9.92E+00	na
121-44-8	Triethylamine	3.32E-01 a	na	6.14E-01 a	na
122-39-4	Diphenylamine	5.33E-02 b	na	1.80E+00 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	2.60E-06 d	na	8.45E-06 d
126-73-8	Tributyl Phosphate	6.44E-03 b	1.45E-06 d	1.07E-01 b	4.62E-05 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	1.23E+01	na	2.51E+01	na
127-18-4	1,1,2,2-Tetrachloroethylene	1.25E-01	1.32E-05	3.40E+00	7.44E-04
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.37E-03 b	na	2.78E-03 b	na
156-59-2	cis-1,2-Dichloroethylene	1.24E-01 b	na	3.48E-01 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	6.89E-02 b	na	1.89E+01 b	na
309-00-2	Aldrin	7.04E+01 b	1.06E-02	2.61E+05 b	5.71E+01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	1.59E-03	na	1.80E-01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	4.46E-04	na	4.98E-02
621-64-7	N-Nitrosodi-N-propylamine	na	1.71E-03 d	na	5.45E-03 d
1314-62-1	Vanadium pentoxide	1.46E-01 b	na	9.33E+00 b	na
1330-20-7	Xylenes (mixtures)	8.41E-03	na	1.12E-01	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.30E-03 d	na	1.93E+01 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	2.60E-04 d	na	3.85E+00 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	4.55E-05 d	na	6.75E-01 d
6533-73-9	Thallium carbonate	1.54E+01 b	na	4.85E+04 b	na
7429-90-5	Aluminum	4.26E-02	na	2.41E-01	na
7439-96-5	Manganese	4.16E+00 e	na	5.30E+00 e	na
7439-98-7	Molybdenum	2.51E-01 b	na	1.44E+00 b	na
7440-02-0	Nickel (soluble salts)	6.29E-02 b	na	2.19E+00 b	na
7440-22-4	Silver	2.52E-01 b	na	1.38E+00 b	na
7440-24-6	Strontium, Stable	2.10E-03 b	na	4.72E-02 b	na
7440-31-5	Tin	2.14E-03 b	na	1.95E+00 b	na
7440-36-0	Antimony	3.29E+00 b	na	1.14E+02 b	na
7440-38-2	Arsenic (inorganic)	4.20E+00 b	5.44E-04	3.32E+02 b	6.33E-02
7440-39-3	Barium	4.31E-01	na	5.07E-01	na
7440-41-7	Beryllium and compounds	1.10E+01	1.26E-03 c	3.38E+01	8.21E-02 c
7440-42-8	Boron and borates only	2.40E-02	na	5.81E-02	na
7440-43-9	Cadmium	2.86E+00 bf	7.33E-05 c	1.28E+02 bf	7.33E-05 c
7440-48-4	Cobalt	1.04E+01	1.31E-03 c	1.64E+01	2.51E-01 c
7440-66-6	Zinc and compounds	4.20E-03 b	na	3.42E-01 b	na
7487-94-7	Mercuric chloride	4.44E+00 b	na	1.30E+03 b	na
7664-41-7	Ammonia	2.15E-02 a	na	4.68E-02 a	na
7723-14-0	Phosphorus, white	6.30E+01 b	na	2.92E+04 b	na
7782-41-4	Fluorine (soluble fluoride)	2.10E-02 b	na	1.46E-01 b	na
7782-49-2	Selenium and compounds	2.51E-01 b	na	1.36E+01 b	na
8001-35-2	Toxaphene	na	3.34E-04	na	1.03E+00

Table C9. Unit Factors for the HSRAM Recreational Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	7.81E-04 b	na	1.76E-03 b	na
14797-65-0	Nitrite	1.22E-02 b	na	2.78E-02 b	na
16065-83-1	Chromium (III) (insoluble salts)	9.61E-04 b	na	5.97E-02 b	na
18540-29-9	Chromium (VI) (soluble salts)	4.45E-01 g	1.07E-06 c	2.66E+01 g	1.07E-06 c
none	Uranium (soluble salts)	2.04E+00 b	na	1.18E+01 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the HSRAM Recreational Visitor is calculated using intakes from 30 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration. The “Inland Well” column assumes all of the contaminated water comes from the well. The “Columbia River” column assumes that all of the contaminated water comes from the Columbia River.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.

Table C10. Unit Factor Ratios for the HSRAM Recreational Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride				
57-12-5	Cyanide, free				
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)				
60-34-4	Methylhydrazine				
60-57-1	Dieldrin				
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)				
67-66-3	Chloroform				
71-36-3	n-Butyl alcohol (n-Butanol)				
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)	11.2		22.2	
75-00-3	Ethyl Chloride	11.2		20.7	
75-01-4	Vinyl chloride (Chloroethylene)				
75-05-8	Acetonitrile	11.2		21.8	
75-07-0	Acetaldehyde	11.2	11.2	21.7	34.2
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane	11.2		16.2	
75-68-3	Chloro-1,1-difluoroethane, 1-	11.5		43.4	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor				
78-87-5	1,2-Dichloropropane			1.26	
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane				
79-01-6	Trichloroethylene				
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C10. Unit Factor Ratios for the HSRAm Recreational Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)				
83-32-9	Acenaphthene				
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene				
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl				
95-50-1	1,2-Dichlorobenzene (ortho-)				
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone				
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)	11.7		313	
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	11.2		33.0	
106-99-0	1,3-Butadiene	11.4	11.6	37.2	68.1
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	11.2		18.6	
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane	12.9		434	
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone				
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)				
110-54-3	n-Hexane				
110-86-1	Pyridine				
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				

Table C10. Unit Factor Ratios for the HSRAM Recreational Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene				
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	11.2		20.8	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)				
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)				
156-59-2	cis-1,2-Dichloroethylene				
206-44-0	Fluoranthene (1,2-Benzacenaphthene)				
309-00-2	Aldrin				
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)				
1336-36-3	Polychlorinated Biphenyls (low risk)				
1336-36-3	Polychlorinated Biphenyls (lowest risk)				
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum				
7440-02-0	Nickel (soluble salts)				
7440-22-4	Silver				
7440-24-6	Strontium, Stable				
7440-31-5	Tin				
7440-36-0	Antimony				
7440-38-2	Arsenic (inorganic)				
7440-39-3	Barium				
7440-41-7	Beryllium and compounds		12.9		841
7440-42-8	Boron and borates only				
7440-43-9	Cadmium				
7440-48-4	Cobalt		11.5		2,203
7440-66-6	Zinc and compounds				
7487-94-7	Mercuric chloride				
7664-41-7	Ammonia	73.7		160	
7723-14-0	Phosphorus, white				
7782-41-4	Fluorine (soluble fluoride)				
7782-49-2	Selenium and compounds				
8001-35-2	Toxaphene				

Table C10. Unit Factor Ratios for the HSRAM Recreational Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate				
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C9 divided by the unit factors in Table 25.
- Ratios less than 1.2 are not listed.

Table C11. Unit Factors for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	7.12E-01 d	na	1.36E+01 d
53-70-3	Dibenz[a,h]anthracene	na	1.25E+00	na	3.97E+01
56-23-5	Carbon tetrachloride	1.76E+02 b	4.39E-03	1.93E+02 b	5.07E-03
57-12-5	Cyanide, free	4.44E+02 b	na	4.44E+02 b	na
57-14-7	1,1-Dimethylhydrazine	na	4.30E+00	na	4.30E+00
57-55-6	Propylene glycol (1,2-Propanediol)	5.58E-02 b	na	5.58E-02 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	3.62E+02 b	4.12E-02 d	5.55E+02 b	7.32E-02 d
60-34-4	Methylhydrazine	na	3.22E+00	na	3.22E+00
60-57-1	Dieldrin	2.00E+03 b	6.02E-01	2.43E+04 b	8.25E+00
62-75-9	N-Nitrosodimethylamine	na	3.47E+01	na	3.47E+01
64-18-6	Formic acid	4.73E-01 b	na	4.74E-01 b	na
67-56-1	Methanol (Methyl alcohol)	1.26E+00 b	na	1.26E+00 b	na
67-64-1	Acetone (2-Propanone)	2.82E+00 b	na	2.84E+00 b	na
67-66-3	Chloroform	1.27E+01 b	3.76E-03	1.30E+01 b	3.76E-03
71-36-3	n-Butyl alcohol (n-Butanol)	1.60E+00 b	na	1.62E+00 b	na
71-43-2	Benzene	3.06E+01	2.16E-03	3.15E+01	2.25E-03
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	5.17E-01	na	5.50E-01	na
72-20-8	Endrin	6.49E+02 b	na	3.38E+03 b	na
74-83-9	Bromomethane	1.30E+02	na	1.31E+02	na
74-87-3	Methyl chloride (Chloromethane)	5.76E+00 a	na	5.79E+00 a	na
75-00-3	Ethyl Chloride	5.07E-02 a	na	5.09E-02 a	na
75-01-4	Vinyl chloride (Chloroethylene)	2.76E+01	2.40E-02	2.82E+01	2.49E-02
75-05-8	Acetonitrile	1.50E+01 a	na	1.51E+01 a	na
75-07-0	Acetaldehyde	8.31E+01 a	6.48E-04 c	8.33E+01 a	6.50E-04 c
75-09-2	Dichloromethane (Methylene chloride)	1.40E+00	2.13E-04	1.41E+00	2.15E-04
75-15-0	Carbon disulfide	1.25E+00	na	1.27E+00	na
75-21-8	Ethylene Oxide (Oxirane)	na	7.75E-02	na	7.80E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.47E+00	na	1.49E+00	na
75-35-4	1,1-Dichloroethylene	3.29E+00	na	3.36E+00	na
75-45-6	Chlorodifluoromethane	1.03E-02 a	na	1.03E-02 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	1.70E-02 a	na	1.71E-02 a	na
75-69-4	Trichlorofluoromethane	7.80E-01	na	8.07E-01	na
75-71-8	Dichlorodifluoromethane	2.26E+00	na	2.28E+00	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	1.49E-02	na	1.57E-02	na
76-44-8	Heptachlor	2.75E+02 b	3.06E-01	7.98E+03 b	7.74E+00
78-87-5	1,2-Dichloropropane	9.55E+01 a	na	9.55E+01 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	6.48E-01	na	6.50E-01	na
79-00-5	1,1,2-Trichloroethane	3.28E+01 b	3.66E-03	3.34E+01 b	3.71E-03
79-01-6	Trichloroethylene	2.13E+01 b	4.63E-04	2.25E+01 b	4.96E-04
79-10-7	2-Propenoic acid (Acrylic acid)	6.25E+00	na	6.25E+00	na

Table C11. Unit Factors for the HSRAm Residential Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	1.31E-02	na	1.36E-02
82-68-8	Pentachloronitrobenzene (PCNB)	4.36E+01 b	1.07E-02 d	1.40E+02 b	4.31E-02 d
83-32-9	Acenaphthene	2.52E+00 b	na	3.97E+00 b	na
84-66-2	Diethyl phthalate	1.63E-01 b	na	1.70E-01 b	na
84-74-2	Dibutyl phthalate	8.24E-01 b	na	3.10E+00 b	na
85-68-7	Butyl benzyl phthalate	4.25E-01 b	na	2.14E+00 b	na
87-68-3	Hexachlorobutadiene	6.62E+02 b	5.06E-03	2.53E+03 b	1.76E-02
87-86-5	Pentachlorophenol	2.74E+00 b	2.45E-03 d	1.19E+01 b	1.65E-02 d
88-06-2	2,4,6-Trichlorophenol	na	3.39E-04	na	4.48E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1.35E+02 b	na	1.83E+02 b	na
91-20-3	Naphthalene	1.31E+02	na	1.32E+02	na
92-52-4	1,1'-Biphenyl	2.85E+00 b	na	4.74E+00 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.41E+00 b	na	1.80E+00 b	na
95-63-6	1,2,4-Trimethylbenzene	6.50E+01	na	6.60E+01	na
98-86-2	Acetophenone	1.71E+00 b	na	1.71E+00 b	na
98-95-3	Nitrobenzene	4.61E+02	na	4.66E+02	na
100-25-4	1,4-Dinitrobenzene (para-)	2.22E+03 b	na	2.23E+03 b	na
100-41-4	Ethyl benzene	1.10E+00	na	1.31E+00	na
100-42-5	Styrene	7.47E-01	na	8.24E-01	na
100-51-6	Benzyl alcohol	7.16E-01 b	na	7.17E-01 b	na
106-46-7	1,4-Dichlorobenzene (para-)	6.31E-01 a	9.48E-04 d	7.09E-01 a	1.31E-03 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	2.62E+03 a	1.79E+00	2.64E+03 a	1.88E+00
106-99-0	1,3-Butadiene	2.52E+02 a	5.71E-03 c	2.54E+02 a	5.77E-03 c
107-02-8	Acrolein	1.93E+04	na	1.93E+04	na
107-05-1	3-Chloropropene (Allyl chloride)	3.81E+02	na	3.81E+02	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	5.94E-03	na	5.98E-03
107-13-1	Acrylonitrile	3.28E+02	3.52E-02	3.30E+02	3.55E-02
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.80E-01 a	na	1.80E-01 a	na
108-67-8	1,3,5-Trimethylbenzene	6.49E+01	na	6.56E+01	na
108-87-2	Methyl cyclohexane	1.72E-01 a	na	2.01E-01 a	na
108-88-3	Toluene (Methyl benzene)	1.31E+00	na	1.36E+00	na
108-90-7	Chlorobenzene	2.28E+01	na	2.35E+01	na
108-94-1	Cyclohexanone	4.61E-02 b	na	4.64E-02 b	na
108-95-2	Phenol (Carbolic acid)	1.10E+00 b	na	1.10E+00 b	na
110-00-9	Furan (Oxacyclopentadiene)	1.31E+02 b	na	1.32E+02 b	na
110-54-3	n-Hexane	3.34E+00	na	4.74E+00	na
110-86-1	Pyridine	3.11E+02 b	na	3.12E+02 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	3.28E-01	na	3.30E-01	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	3.68E-01 b	na	3.69E-01 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	2.81E+01 b	3.17E-03 d	4.17E+01 b	4.79E-03 d

Table C11. Unit Factors for the HSRAm Residential Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	1.55E+01 b	na	2.04E+01 b	na
118-74-1	Hexachlorobenzene	2.00E+02 b	1.24E-01	2.71E+03 b	1.50E+00
120-82-1	1,2,4-Trichlorobenzene	9.29E+00	na	1.91E+01	na
121-44-8	Triethylamine	8.29E+01 a	na	8.32E+01 a	na
122-39-4	Diphenylamine	5.97E+00 b	na	7.72E+00 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.44E-03 d	na	1.44E-03 d
126-73-8	Tributyl Phosphate	5.32E-01 b	1.67E-04 d	6.33E-01 b	2.12E-04 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	1.64E+03	na	1.65E+03	na
127-18-4	1,1,2,2-Tetrachloroethylene	7.55E+00	8.79E-04	1.08E+01	1.61E-03
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.83E-01 b	na	1.84E-01 b	na
156-59-2	cis-1,2-Dichloroethylene	1.26E+01 b	na	1.28E+01 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	4.32E+00 b	na	2.32E+01 b	na
309-00-2	Aldrin	5.59E+03 b	1.38E+00	2.67E+05 b	5.85E+01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	3.02E-01	na	4.80E-01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	4.97E-02	na	9.90E-02
621-64-7	N-Nitrosodi-N-propylamine	na	1.03E+00 d	na	1.03E+00 d
1314-62-1	Vanadium pentoxide	8.13E+00 b	na	1.73E+01 b	na
1330-20-7	Xylenes (mixtures)	4.15E+00	na	4.26E+00	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.18E-01 d	na	1.94E+01 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	2.35E-02 d	na	3.88E+00 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	4.11E-03 d	na	6.79E-01 d
6533-73-9	Thallium carbonate	8.53E+02 b	na	4.93E+04 b	na
7429-90-5	Aluminum	7.60E+01	na	7.62E+01	na
7439-96-5	Manganese	7.59E+03 e	na	7.59E+03 e	na
7439-98-7	Molybdenum	4.90E+01 b	na	5.02E+01 b	na
7440-02-0	Nickel (soluble salts)	6.71E+00 b	na	8.84E+00 b	na
7440-22-4	Silver	2.45E+01 b	na	2.57E+01 b	na
7440-24-6	Strontium, Stable	4.01E-01 b	na	4.46E-01 b	na
7440-31-5	Tin	2.09E-01 b	na	2.15E+00 b	na
7440-36-0	Antimony	3.22E+02 b	na	4.33E+02 b	na
7440-38-2	Arsenic (inorganic)	4.13E+02 b	7.25E-01	7.41E+02 b	7.88E-01
7440-39-3	Barium	7.60E+02	na	7.60E+02	na
7440-41-7	Beryllium and compounds	1.90E+04	4.58E-01 c	1.91E+04	5.39E-01 c
7440-42-8	Boron and borates only	2.24E+01	na	2.25E+01	na
7440-43-9	Cadmium	2.83E+02 bf	2.93E-01 c	4.08E+02 bf	2.93E-01 c
7440-48-4	Cobalt	1.90E+04	5.50E-01 c	1.90E+04	7.99E-01 c
7440-66-6	Zinc and compounds	1.52E+01 b	na	1.55E+01 b	na
7487-94-7	Mercuric chloride	9.87E+02 b	na	2.29E+03 b	na
7664-41-7	Ammonia	1.70E+02 a	na	1.70E+02 a	na
7723-14-0	Phosphorus, white	3.41E+04 b	na	6.33E+04 b	na
7782-41-4	Fluorine (soluble fluoride)	2.07E+00 b	na	2.19E+00 b	na
7782-49-2	Selenium and compounds	2.49E+01 b	na	3.82E+01 b	na
8001-35-2	Toxaphene	na	3.33E-02	na	1.06E+00

Table C11. Unit Factors for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	7.37E-02 b	na	7.47E-02 b	na
14797-65-0	Nitrite	6.41E-01 b	na	6.56E-01 b	na
16065-83-1	Chromium (III) (insoluble salts)	5.24E-02 b	na	1.11E-01 b	na
18540-29-9	Chromium (VI) (soluble salts)	2.40E+01 g	6.00E-05 c	5.02E+01 g	6.00E-05 c
none	Uranium (soluble salts)	1.16E+02 b	na	1.25E+02 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the HSRAM Residential scenario is calculated using intakes from 30 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration. The “Inland Well” column assumes all of the contaminated water comes from the well. The “Columbia River” column assumes that all of the contaminated water comes from the Columbia River.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.

Table C12. Unit Factor Ratios for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	1.79		1.67	
57-12-5	Cyanide, free				
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)				
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	1.29			
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)	1.24		1.24	
67-66-3	Chloroform	1.75		1.72	
71-36-3	n-Butyl alcohol (n-Butanol)				
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)	1.36		1.37	
75-00-3	Ethyl Chloride	1.34		1.34	
75-01-4	Vinyl chloride (Chloroethylene)				
75-05-8	Acetonitrile	2.37		2.37	
75-07-0	Acetaldehyde	1.97	1.81	1.97	1.82
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane	1.35		1.35	
75-68-3	Chloro-1,1-difluoroethane, 1-	2.24		2.25	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor	1.65			
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	1.70		1.68	
79-01-6	Trichloroethylene	1.74		1.67	
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C12. Unit Factor Ratios for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	1.71	2.30		
83-32-9	Acenaphthene	1.56		1.29	
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	1.69			
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	1.61		1.30	
95-50-1	1,2-Dichlorobenzene (ortho-)	1.75		1.50	
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone				
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)	1.33	2.43	1.49	1.74
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.38		1.39	
106-99-0	1,3-Butadiene	1.32		1.34	
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.42		1.42	
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane	1.36		1.58	
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone				
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	1.71		1.70	
110-54-3	n-Hexane				
110-86-1	Pyridine				
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				

Table C12. Unit Factor Ratios for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	1.51			
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	1.53		1.53	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)				
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.49		1.49	
156-59-2	cis-1,2-Dichloroethylene	1.76		1.73	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)				
309-00-2	Aldrin	1.48			
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		1.66		
1336-36-3	Polychlorinated Biphenyls (low risk)		1.66		
1336-36-3	Polychlorinated Biphenyls (lowest risk)		1.66		
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum	1.28		1.28	
7440-02-0	Nickel (soluble salts)	1.68		1.44	
7440-22-4	Silver	1.79		1.73	
7440-24-6	Strontium, Stable	1.29		1.25	
7440-31-5	Tin	1.77			
7440-36-0	Antimony	1.73		1.46	
7440-38-2	Arsenic (inorganic)	1.78		1.32	
7440-39-3	Barium				
7440-41-7	Beryllium and compounds				1.38
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	1.62		1.36	
7440-48-4	Cobalt		1.21		1.75
7440-66-6	Zinc and compounds				
7487-94-7	Mercuric chloride	2.79		1.38	
7664-41-7	Ammonia	317		317	
7723-14-0	Phosphorus, white				
7782-41-4	Fluorine (soluble fluoride)	1.78		1.70	
7782-49-2	Selenium and compounds	1.77		1.40	
8001-35-2	Toxaphene				

Table C12. Unit Factor Ratios for the HSRAM Residential Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	1.85		1.83	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C11 divided by the unit factors in Table 27.
- Ratios less than 1.2 are not listed.

Table C13. Unit Factors for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	8.72E-01 d	na	1.38E+01 d
53-70-3	Dibenz[a,h]anthracene	na	1.89E+00	na	4.04E+01
56-23-5	Carbon tetrachloride	1.76E+02 b	4.39E-03	1.93E+02 b	5.07E-03
57-12-5	Cyanide, free	4.44E+02 b	na	4.44E+02 b	na
57-14-7	1,1-Dimethylhydrazine	na	4.30E+00	na	4.30E+00
57-55-6	Propylene glycol (1,2-Propanediol)	5.58E-02 b	na	5.58E-02 b	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	3.63E+02 b	4.14E-02 d	5.56E+02 b	7.35E-02 d
60-34-4	Methylhydrazine	na	3.22E+00	na	3.22E+00
60-57-1	Dieldrin	2.17E+03 b	6.62E-01	2.45E+04 b	8.31E+00
62-75-9	N-Nitrosodimethylamine	na	3.47E+01	na	3.47E+01
64-18-6	Formic acid	4.73E-01 b	na	4.74E-01 b	na
67-56-1	Methanol (Methyl alcohol)	1.26E+00 b	na	1.26E+00 b	na
67-64-1	Acetone (2-Propanone)	2.82E+00 b	na	2.84E+00 b	na
67-66-3	Chloroform	1.27E+01 b	3.76E-03	1.30E+01 b	3.76E-03
71-36-3	n-Butyl alcohol (n-Butanol)	1.60E+00 b	na	1.62E+00 b	na
71-43-2	Benzene	3.06E+01	2.16E-03	3.15E+01	2.25E-03
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	5.17E-01	na	5.50E-01	na
72-20-8	Endrin	6.70E+02 b	na	3.40E+03 b	na
74-83-9	Bromomethane	1.30E+02	na	1.31E+02	na
74-87-3	Methyl chloride (Chloromethane)	5.76E+00 a	na	5.79E+00 a	na
75-00-3	Ethyl Chloride	5.07E-02 a	na	5.09E-02 a	na
75-01-4	Vinyl chloride (Chloroethylene)	2.76E+01	2.40E-02	2.82E+01	2.49E-02
75-05-8	Acetonitrile	1.50E+01 a	na	1.51E+01 a	na
75-07-0	Acetaldehyde	8.31E+01 a	6.48E-04 c	8.33E+01 a	6.50E-04 c
75-09-2	Dichloromethane (Methylene chloride)	1.40E+00	2.13E-04	1.41E+00	2.15E-04
75-15-0	Carbon disulfide	1.25E+00	na	1.27E+00	na
75-21-8	Ethylene Oxide (Oxirane)	na	7.75E-02	na	7.80E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.47E+00	na	1.49E+00	na
75-35-4	1,1-Dichloroethylene	3.29E+00	na	3.36E+00	na
75-45-6	Chlorodifluoromethane	1.03E-02 a	na	1.03E-02 a	na
75-68-3	Chloro-1,1-difluoroethane, 1-	1.70E-02 a	na	1.71E-02 a	na
75-69-4	Trichlorofluoromethane	7.80E-01	na	8.07E-01	na
75-71-8	Dichlorodifluoromethane	2.26E+00	na	2.28E+00	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	1.49E-02	na	1.57E-02	na
76-44-8	Heptachlor	3.42E+02 b	3.70E-01	8.05E+03 b	7.80E+00
78-87-5	1,2-Dichloropropane	9.55E+01 a	na	9.55E+01 a	na
78-93-3	Methyl ethyl ketone (2-Butanone)	6.48E-01	na	6.50E-01	na
79-00-5	1,1,2-Trichloroethane	3.28E+01 b	3.66E-03	3.34E+01 b	3.71E-03
79-01-6	Trichloroethylene	2.13E+01 b	4.63E-04	2.25E+01 b	4.96E-04
79-10-7	2-Propenoic acid (Acrylic acid)	6.25E+00	na	6.25E+00	na

Table C13. Unit Factors for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	1.31E-02	na	1.36E-02
82-68-8	Pentachloronitrobenzene (PCNB)	4.40E+01 b	1.09E-02 d	1.41E+02 b	4.32E-02 d
83-32-9	Acenaphthene	2.53E+00 b	na	3.98E+00 b	na
84-66-2	Diethyl phthalate	1.63E-01 b	na	1.70E-01 b	na
84-74-2	Dibutyl phthalate	8.35E-01 b	na	3.11E+00 b	na
85-68-7	Butyl benzyl phthalate	4.38E-01 b	na	2.15E+00 b	na
87-68-3	Hexachlorobutadiene	6.66E+02 b	5.08E-03	2.54E+03 b	1.76E-02
87-86-5	Pentachlorophenol	2.89E+00 b	2.68E-03 d	1.20E+01 b	1.67E-02 d
88-06-2	2,4,6-Trichlorophenol	na	3.40E-04	na	4.50E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1.36E+02 b	na	1.83E+02 b	na
91-20-3	Naphthalene	1.31E+02	na	1.32E+02	na
92-52-4	1,1'-Biphenyl	2.86E+00 b	na	4.74E+00 b	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.41E+00 b	na	1.80E+00 b	na
95-63-6	1,2,4-Trimethylbenzene	6.50E+01	na	6.60E+01	na
98-86-2	Acetophenone	1.71E+00 b	na	1.71E+00 b	na
98-95-3	Nitrobenzene	4.61E+02	na	4.66E+02	na
100-25-4	1,4-Dinitrobenzene (para-)	2.22E+03 b	na	2.23E+03 b	na
100-41-4	Ethyl benzene	1.10E+00	na	1.31E+00	na
100-42-5	Styrene	7.47E-01	na	8.24E-01	na
100-51-6	Benzyl alcohol	7.16E-01 b	na	7.17E-01 b	na
106-46-7	1,4-Dichlorobenzene (para-)	6.31E-01 a	9.49E-04 d	7.09E-01 a	1.31E-03 d
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	2.62E+03 a	1.79E+00	2.64E+03 a	1.88E+00
106-99-0	1,3-Butadiene	2.52E+02 a	5.71E-03 c	2.54E+02 a	5.77E-03 c
107-02-8	Acrolein	1.93E+04	na	1.93E+04	na
107-05-1	3-Chloropropene (Allyl chloride)	3.81E+02	na	3.81E+02	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	5.94E-03	na	5.98E-03
107-13-1	Acrylonitrile	3.28E+02	3.52E-02	3.30E+02	3.55E-02
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.80E-01 a	na	1.80E-01 a	na
108-67-8	1,3,5-Trimethylbenzene	6.49E+01	na	6.56E+01	na
108-87-2	Methyl cyclohexane	1.72E-01 a	na	2.01E-01 a	na
108-88-3	Toluene (Methyl benzene)	1.31E+00	na	1.36E+00	na
108-90-7	Chlorobenzene	2.28E+01	na	2.35E+01	na
108-94-1	Cyclohexanone	4.61E-02 b	na	4.64E-02 b	na
108-95-2	Phenol (Carbolic acid)	1.10E+00 b	na	1.10E+00 b	na
110-00-9	Furan (Oxacyclopentadiene)	1.31E+02 b	na	1.32E+02 b	na
110-54-3	n-Hexane	3.34E+00	na	4.74E+00	na
110-86-1	Pyridine	3.11E+02 b	na	3.12E+02 b	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	3.28E-01	na	3.30E-01	na
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	3.68E-01 b	na	3.69E-01 b	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	9.63E+01 b	1.13E-02 d	1.10E+02 b	1.30E-02 d

Table C13. Unit Factors for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate	2.29E+02 b	na	2.34E+02 b	na
118-74-1	Hexachlorobenzene	2.09E+02 b	1.29E-01	2.72E+03 b	1.51E+00
120-82-1	1,2,4-Trichlorobenzene	9.31E+00	na	1.91E+01	na
121-44-8	Triethylamine	8.29E+01 a	na	8.32E+01 a	na
122-39-4	Diphenylamine	5.99E+00 b	na	7.74E+00 b	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.44E-03 d	na	1.44E-03 d
126-73-8	Tributyl Phosphate	5.38E-01 b	1.69E-04 d	6.38E-01 b	2.14E-04 d
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	1.64E+03	na	1.65E+03	na
127-18-4	1,1,2,2-Tetrachloroethylene	7.55E+00	8.80E-04	1.08E+01	1.61E-03
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.83E-01 b	na	1.84E-01 b	na
156-59-2	cis-1,2-Dichloroethylene	1.26E+01 b	na	1.28E+01 b	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	4.48E+00 b	na	2.33E+01 b	na
309-00-2	Aldrin	9.02E+03 b	2.13E+00	2.70E+05 b	5.92E+01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	3.03E-01	na	4.81E-01
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	5.01E-02	na	9.94E-02
621-64-7	N-Nitrosodi-N-propylamine	na	1.03E+00 d	na	1.03E+00 d
1314-62-1	Vanadium pentoxide	8.29E+00 b	na	1.75E+01 b	na
1330-20-7	Xylenes (mixtures)	4.15E+00	na	4.26E+00	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.57E-01 d	na	1.94E+01 d
1336-36-3	Polychlorinated Biphenyls (low risk)	na	3.13E-02 d	na	3.89E+00 d
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	5.48E-03 d	na	6.80E-01 d
6533-73-9	Thallium carbonate	1.18E+03 b	na	4.97E+04 b	na
7429-90-5	Aluminum	7.60E+01	na	7.62E+01	na
7439-96-5	Manganese	7.59E+03 e	na	7.59E+03 e	na
7439-98-7	Molybdenum	5.73E+01 b	na	5.84E+01 b	na
7440-02-0	Nickel (soluble salts)	1.07E+01 b	na	1.28E+01 b	na
7440-22-4	Silver	2.49E+01 b	na	2.60E+01 b	na
7440-24-6	Strontium, Stable	5.49E-01 b	na	5.94E-01 b	na
7440-31-5	Tin	2.88E-01 b	na	2.23E+00 b	na
7440-36-0	Antimony	3.22E+02 b	na	4.34E+02 b	na
7440-38-2	Arsenic (inorganic)	4.18E+02 b	7.26E-01	7.45E+02 b	7.89E-01
7440-39-3	Barium	7.60E+02	na	7.60E+02	na
7440-41-7	Beryllium and compounds	1.90E+04	4.59E-01 c	1.91E+04	5.40E-01 c
7440-42-8	Boron and borates only	2.32E+01	na	2.32E+01	na
7440-43-9	Cadmium	2.92E+02 bf	2.93E-01 c	4.17E+02 bf	2.93E-01 c
7440-48-4	Cobalt	1.90E+04	5.69E-01 c	1.90E+04	8.19E-01 c
7440-66-6	Zinc and compounds	7.63E+01 b	na	7.67E+01 b	na
7487-94-7	Mercuric chloride	2.18E+03 b	na	3.48E+03 b	na
7664-41-7	Ammonia	1.70E+02 a	na	1.70E+02 a	na
7723-14-0	Phosphorus, white	1.45E+05 b	na	1.74E+05 b	na
7782-41-4	Fluorine (soluble fluoride)	3.51E+00 b	na	3.64E+00 b	na
7782-49-2	Selenium and compounds	2.78E+01 b	na	4.11E+01 b	na
8001-35-2	Toxaphene	na	4.42E-02	na	1.07E+00

Table C13. Unit Factors for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only, per mg/L		Columbia River, per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	7.37E-02 b	na	7.47E-02 b	na
14797-65-0	Nitrite	6.41E-01 b	na	6.56E-01 b	na
16065-83-1	Chromium (III) (insoluble salts)	5.55E-02 b	na	1.14E-01 b	na
18540-29-9	Chromium (VI) (soluble salts)	2.47E+01 g	6.00E-05 c	5.09E+01 g	6.00E-05 c
none	Uranium (soluble salts)	1.18E+02 b	na	1.27E+02 b	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The total risk to the HSRAM Agricultural scenario is calculated using intakes from 30 consecutive years. The soil concentration is zero at the start of the exposure.
- These scenario factors must be multiplied by the appropriate water concentration. The “Inland Well” column assumes all of the contaminated water comes from the well. The “Columbia River” column assumes that all of the contaminated water comes from the Columbia River.
- Results with notes (a, b, c, d, e, f, or g) have the following qualifiers:
 - (a) -- The RfD for ingestion was imputed.
 - (b) -- The RfD for inhalation was imputed.
 - (c) -- The Slope Factor for ingestion was imputed.
 - (d) -- The Slope Factor for inhalation was imputed.
 - (e) -- For manganese (7439-96-5) the drinking water has a lower RfD.
 - (f) -- For cadmium (7440-43-9) the food has a larger RfD.
 - (g) -- For chromium VI (18540-29-9) the airborne particulate has a larger RfD.

Table C14. Unit Factor Ratios for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene				
53-70-3	Dibenz[a,h]anthracene				
56-23-5	Carbon tetrachloride	1.79		1.67	
57-12-5	Cyanide, free				
57-14-7	1,1-Dimethylhydrazine				
57-55-6	Propylene glycol (1,2-Propanediol)				
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)				
60-34-4	Methylhydrazine				
60-57-1	Dieldrin	1.26			
62-75-9	N-Nitrosodimethylamine				
64-18-6	Formic acid				
67-56-1	Methanol (Methyl alcohol)				
67-64-1	Acetone (2-Propanone)	1.24		1.24	
67-66-3	Chloroform	1.75		1.72	
71-36-3	n-Butyl alcohol (n-Butanol)				
71-43-2	Benzene				
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)				
72-20-8	Endrin				
74-83-9	Bromomethane				
74-87-3	Methyl chloride (Chloromethane)	1.36		1.37	
75-00-3	Ethyl Chloride	1.34		1.34	
75-01-4	Vinyl chloride (Chloroethylene)				
75-05-8	Acetonitrile	2.37		2.37	
75-07-0	Acetaldehyde	1.97	1.81	1.97	1.82
75-09-2	Dichloromethane (Methylene chloride)				
75-15-0	Carbon disulfide				
75-21-8	Ethylene Oxide (Oxirane)				
75-34-3	1,1-Dichloroethane (Ethylidene chloride)				
75-35-4	1,1-Dichloroethylene				
75-45-6	Chlorodifluoromethane	1.35		1.35	
75-68-3	Chloro-1,1-difluoroethane, 1-	2.24		2.25	
75-69-4	Trichlorofluoromethane				
75-71-8	Dichlorodifluoromethane				
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)				
76-44-8	Heptachlor	1.46			
78-87-5	1,2-Dichloropropane				
78-93-3	Methyl ethyl ketone (2-Butanone)				
79-00-5	1,1,2-Trichloroethane	1.70		1.68	
79-01-6	Trichloroethylene	1.74		1.67	
79-10-7	2-Propenoic acid (Acrylic acid)				

Table C14. Unit Factor Ratios for the HSRAm Agricultural Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)				
82-68-8	Pentachloronitrobenzene (PCNB)	1.70	2.26		
83-32-9	Acenaphthene	1.56		1.29	
84-66-2	Diethyl phthalate				
84-74-2	Dibutyl phthalate				
85-68-7	Butyl benzyl phthalate				
87-68-3	Hexachlorobutadiene	1.69			
87-86-5	Pentachlorophenol				
88-06-2	2,4,6-Trichlorophenol				
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)				
91-20-3	Naphthalene				
92-52-4	1,1'-Biphenyl	1.61		1.30	
95-50-1	1,2-Dichlorobenzene (ortho-)	1.75		1.50	
95-63-6	1,2,4-Trimethylbenzene				
98-86-2	Acetophenone				
98-95-3	Nitrobenzene				
100-25-4	1,4-Dinitrobenzene (para-)				
100-41-4	Ethyl benzene				
100-42-5	Styrene				
100-51-6	Benzyl alcohol				
106-46-7	1,4-Dichlorobenzene (para-)	1.33	2.43	1.50	1.74
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.38		1.39	
106-99-0	1,3-Butadiene	1.32		1.34	
107-02-8	Acrolein				
107-05-1	3-Chloropropene (Allyl chloride)				
107-06-2	1,2-Dichloroethane (Ethylene chloride)				
107-13-1	Acrylonitrile				
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	1.42		1.42	
108-67-8	1,3,5-Trimethylbenzene				
108-87-2	Methyl cyclohexane	1.36		1.58	
108-88-3	Toluene (Methyl benzene)				
108-90-7	Chlorobenzene				
108-94-1	Cyclohexanone				
108-95-2	Phenol (Carbolic acid)				
110-00-9	Furan (Oxacyclopentadiene)	1.71		1.70	
110-54-3	n-Hexane				
110-86-1	Pyridine				
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)				
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)				
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)				

Table C14. Unit Factor Ratios for the HSRAm Agricultural Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
117-84-0	Di-n-octylphthalate				
118-74-1	Hexachlorobenzene	1.48			
120-82-1	1,2,4-Trichlorobenzene				
121-44-8	Triethylamine	1.53		1.53	
122-39-4	Diphenylamine				
123-91-1	1,4-Dioxane (Diethylene oxide)				
126-73-8	Tributyl Phosphate				
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)				
127-18-4	1,1,2,2-Tetrachloroethylene				
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	1.49		1.49	
156-59-2	cis-1,2-Dichloroethylene	1.76		1.73	
206-44-0	Fluoranthene (1,2-Benzacenaphthene)				
309-00-2	Aldrin	1.25			
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)				
319-85-7	beta-Benzene hexachloride (beta-Lindane)				
621-64-7	N-Nitrosodi-N-propylamine				
1314-62-1	Vanadium pentoxide				
1330-20-7	Xylenes (mixtures)				
1336-36-3	Polychlorinated Biphenyls (high risk)		1.42		
1336-36-3	Polychlorinated Biphenyls (low risk)		1.42		
1336-36-3	Polychlorinated Biphenyls (lowest risk)		1.42		
6533-73-9	Thallium carbonate				
7429-90-5	Aluminum				
7439-96-5	Manganese				
7439-98-7	Molybdenum	1.23		1.23	
7440-02-0	Nickel (soluble salts)	1.34		1.27	
7440-22-4	Silver	1.77		1.72	
7440-24-6	Strontium, Stable				
7440-31-5	Tin	1.46			
7440-36-0	Antimony	1.73		1.46	
7440-38-2	Arsenic (inorganic)	1.76		1.32	
7440-39-3	Barium				
7440-41-7	Beryllium and compounds				1.38
7440-42-8	Boron and borates only				
7440-43-9	Cadmium	1.59		1.35	
7440-48-4	Cobalt		1.25		1.80
7440-66-6	Zinc and compounds				
7487-94-7	Mercuric chloride	1.41		1.22	
7664-41-7	Ammonia	317		317	
7723-14-0	Phosphorus, white				
7782-41-4	Fluorine (soluble fluoride)	1.35		1.33	
7782-49-2	Selenium and compounds	1.64		1.36	
8001-35-2	Toxaphene				

Table C14. Unit Factor Ratios for the HSRAM Agricultural Scenario.

CASRN	Chemical Name	Well Water Only		Columbia River	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
14797-55-8	Nitrate	1.85		1.83	
14797-65-0	Nitrite				
16065-83-1	Chromium (III) (insoluble salts)				
18540-29-9	Chromium (VI) (soluble salts)				
none	Uranium (soluble salts)				

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The ratios shown are the unit factors in Table C13 divided by the unit factors in Table 29.
- Ratios less than 1.2 are not listed.

Table C15. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Ground Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	8.34E-02	na	8.34E-02
53-70-3	Dibenz[a,h]anthracene	na	8.34E-02	na	8.34E-02
56-23-5	Carbon tetrachloride	1.79E+02	2.97E-03	8.16E+01	2.97E-03
57-12-5	Cyanide, free	3.13E+00	na	1.43E+00	na
57-14-7	1,1-Dimethylhydrazine	na	3.43E-02	na	3.43E-02
57-55-6	Propylene glycol (1,2-Propanediol)	3.13E-03	na	1.43E-03	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	2.08E+02	1.49E-02	9.52E+01	1.49E-02
60-34-4	Methylhydrazine	na	3.43E-02	na	3.43E-02
60-57-1	Dieldrin	1.25E+03	1.83E-01	5.71E+02	1.83E-01
62-75-9	N-Nitrosodimethylamine	na	5.83E-01	na	5.83E-01
64-18-6	Formic acid	3.13E-02	na	1.43E-02	na
67-56-1	Methanol (Methyl alcohol)	2.50E-01	na	1.14E-01	na
67-64-1	Acetone (2-Propanone)	1.25E+00	na	5.71E-01	na
67-66-3	Chloroform	1.25E+01	2.29E-05	5.71E+00	2.29E-05
71-36-3	n-Butyl alcohol (n-Butanol)	6.25E-01	na	2.86E-01	na
71-43-2	Benzene	3.13E+01	1.26E-03	1.43E+01	1.26E-03
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	6.25E-01	na	2.86E-01	na
72-20-8	Endrin	2.08E+02	na	9.52E+01	na
74-83-9	Bromomethane	8.93E+01	na	4.08E+01	na
74-87-3	Methyl chloride (Chloromethane)	2.43E+00	na	1.11E+00	na
75-00-3	Ethyl Chloride	1.09E-02	na	5.00E-03	na
75-01-4	Vinyl chloride (Chloroethylene)	4.17E+01	3.20E-02	1.90E+01	1.60E-02
75-05-8	Acetonitrile	3.65E+00	na	1.67E+00	na
75-07-0	Acetaldehyde	2.43E+01	8.80E-05	1.11E+01	8.80E-05
75-09-2	Dichloromethane (Methylene chloride)	2.08E+00	1.71E-04	9.52E-01	1.71E-04
75-15-0	Carbon disulfide	1.25E+00	na	5.71E-01	na
75-21-8	Ethylene Oxide (Oxirane)	na	2.33E-02	na	2.33E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.25E+00	na	5.71E-01	na
75-35-4	1,1-Dichloroethylene	2.50E+00	na	1.14E+00	na
75-45-6	Chlorodifluoromethane	4.37E-03	na	2.00E-03	na
75-68-3	Chloro-1,1-difluoroethane, 1-	4.37E-03	na	2.00E-03	na
75-69-4	Trichlorofluoromethane	4.17E-01	na	1.90E-01	na
75-71-8	Dichlorodifluoromethane	6.25E-01	na	2.86E-01	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	2.08E-03	na	9.52E-04	na
76-44-8	Heptachlor	1.25E+02	5.14E-02	5.71E+01	5.14E-02
78-87-5	1,2-Dichloropropane	4.17E-01	na	1.90E-01	na
78-93-3	Methyl ethyl ketone (2-Butanone)	2.08E-01	na	9.52E-02	na
79-00-5	1,1,2-Trichloroethane	3.13E+01	1.30E-03	1.43E+01	1.30E-03
79-01-6	Trichloroethylene	2.08E+01	2.51E-04	9.52E+00	2.51E-04

Table C15. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Ground Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-10-7	2-Propenoic acid (Acrylic acid)	1.25E-01	na	5.71E-02	na
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	4.57E-03	na	4.57E-03
82-68-8	Pentachloronitrobenzene (PCNB)	2.08E+01	2.97E-03	9.52E+00	2.97E-03
83-32-9	Acenaphthene	1.04E+00	na	4.76E-01	na
84-66-2	Diethyl phthalate	7.81E-02	na	3.57E-02	na
84-74-2	Dibutyl phthalate	6.25E-01	na	2.86E-01	na
85-68-7	Butyl benzyl phthalate	3.13E-01	na	1.43E-01	na
87-68-3	Hexachlorobutadiene	6.25E+02	1.78E-03	2.86E+02	1.78E-03
87-86-5	Pentachlorophenol	2.08E+00	1.37E-03	9.52E-01	1.37E-03
88-06-2	2,4,6-Trichlorophenol	na	1.26E-04	na	1.26E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	6.25E+01	na	2.86E+01	na
91-20-3	Naphthalene	6.25E+00	na	2.86E+00	na
92-52-4	1,1'-Biphenyl	1.25E+00	na	5.71E-01	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.39E+00	na	6.35E-01	na
95-63-6	1,2,4-Trimethylbenzene	2.50E+00	na	1.14E+00	na
98-86-2	Acetophenone	6.25E-01	na	2.86E-01	na
98-95-3	Nitrobenzene	1.25E+02	na	5.71E+01	na
100-25-4	1,4-Dinitrobenzene (para-)	1.56E+02	na	7.14E+01	na
100-41-4	Ethyl benzene	1.25E+00	na	5.71E-01	na
100-42-5	Styrene	6.25E-01	na	2.86E-01	na
100-51-6	Benzyl alcohol	2.08E-01	na	9.52E-02	na
106-46-7	1,4-Dichlorobenzene (para-)	2.73E-01	5.49E-04	1.25E-01	5.49E-04
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.09E+03	1.94E+00	5.00E+02	1.94E+00
106-99-0	1,3-Butadiene	5.47E+01	6.00E-04	2.50E+01	6.00E-04
107-02-8	Acrolein	2.50E+02	na	1.14E+02	na
107-05-1	3-Chloropropene (Allyl chloride)	1.25E+00	na	5.71E-01	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	2.08E-03	na	2.08E-03
107-13-1	Acrylonitrile	1.25E+02	1.23E-02	5.71E+01	1.23E-02
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	7.29E-02	na	3.33E-02	na
108-67-8	1,3,5-Trimethylbenzene	2.50E+00	na	1.14E+00	na
108-87-2	Methyl cyclohexane	7.29E-02	na	3.33E-02	na
108-88-3	Toluene (Methyl benzene)	6.25E-01	na	2.86E-01	na
108-90-7	Chlorobenzene	6.25E+00	na	2.86E+00	na
108-94-1	Cyclohexanone	1.25E-02	na	5.71E-03	na
108-95-2	Phenol (Carbolic acid)	2.08E-01	na	9.52E-02	na
110-00-9	Furan (Oxacyclopentadiene)	6.25E+01	na	2.86E+01	na
110-54-3	n-Hexane	2.08E+00	na	9.52E-01	na
110-86-1	Pyridine	6.25E+01	na	2.86E+01	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	2.50E-01	na	1.14E-01	na

Table C15. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Ground Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	6.25E-02	na	2.86E-02	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	3.13E+00	1.60E-04	1.43E+00	1.60E-04
117-84-0	Di-n-octylphthalate	3.13E+00	na	1.43E+00	na
118-74-1	Hexachlorobenzene	7.81E+01	1.83E-02	3.57E+01	1.83E-02
120-82-1	1,2,4-Trichlorobenzene	1.25E+01	na	5.71E+00	na
121-44-8	Triethylamine	1.56E+01	na	7.14E+00	na
122-39-4	Diphenylamine	2.50E+00	na	1.14E+00	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.26E-04	na	1.26E-04
126-73-8	Tributyl Phosphate	3.13E-01	6.17E-05	1.43E-01	6.17E-05
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	6.25E+02	na	2.86E+02	na
127-18-4	1,1,2,2-Tetrachloroethylene	1.25E+01	1.19E-03	5.71E+00	1.19E-03
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	6.94E-02	na	3.17E-02	na
156-59-2	cis-1,2-Dichloroethylene	1.25E+01	na	5.71E+00	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.56E+00	na	7.14E-01	na
309-00-2	Aldrin	2.08E+03	1.94E-01	9.52E+02	1.94E-01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	7.20E-02	na	7.20E-02
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	2.06E-02	na	2.06E-02
621-64-7	N-Nitrosodi-N-propylamine	na	8.00E-02	na	8.00E-02
1314-62-1	Vanadium pentoxide	6.94E+00	na	3.17E+00	na
1330-20-7	Xylenes (mixtures)	6.25E-01	na	2.86E-01	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	2.29E-02	na	2.29E-02
1336-36-3	Polychlorinated Biphenyls (low risk)	na	4.57E-03	na	4.57E-03
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	8.00E-04	na	8.00E-04
6533-73-9	Thallium carbonate	7.81E+02	na	3.57E+02	na
7429-90-5	Aluminum	6.25E-02	na	2.86E-02	na
7439-96-5	Manganese	1.34E+00	na	6.12E-01	na
7439-98-7	Molybdenum	1.25E+01	na	5.71E+00	na
7440-02-0	Nickel (soluble salts)	3.13E+00	na	1.43E+00	na
7440-22-4	Silver	1.25E+01	na	5.71E+00	na
7440-24-6	Strontium, Stable	1.04E-01	na	4.76E-02	na
7440-31-5	Tin	1.04E-01	na	4.76E-02	na
7440-36-0	Antimony	1.56E+02	na	7.14E+01	na
7440-38-2	Arsenic (inorganic)	2.08E+02	1.71E-02	9.52E+01	1.71E-02
7440-39-3	Barium	8.93E-01	na	4.08E-01	na
7440-41-7	Beryllium and compounds	3.13E+01	4.80E-02	1.43E+01	4.80E-02
7440-42-8	Boron and borates only	6.94E-01	na	3.17E-01	na
7440-43-9	Cadmium	1.25E+02	na	5.71E+01	na
7440-48-4	Cobalt	3.13E+00	5.60E-02	1.43E+00	5.60E-02
7440-66-6	Zinc and compounds	2.08E-01	na	9.52E-02	na
7487-94-7	Mercuric chloride	2.08E+02	na	9.52E+01	na

Table C15. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Ground Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
7664-41-7	Ammonia	2.19E+00	na	9.99E-01	na
7723-14-0	Phosphorus, white	3.13E+03	na	1.43E+03	na
7782-41-4	Fluorine (soluble fluoride)	1.04E+00	na	4.76E-01	na
7782-49-2	Selenium and compounds	1.25E+01	na	5.71E+00	na
8001-35-2	Toxaphene	na	1.26E-02	na	1.26E-02
14797-55-8	Nitrate	3.91E-02	na	1.79E-02	na
14797-65-0	Nitrite	6.25E-01	na	2.86E-01	na
16065-83-1	Chromium (III) (insoluble salts)	4.17E-02	na	1.90E-02	na
18540-29-9	Chromium (VI) (soluble salts)	2.08E+01	na	9.52E+00	na
none	Uranium (soluble salts)	1.04E+02	na	4.76E+01	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The Method B Hazard Index uses child consumption rates and body mass. All others use the adult numbers. The reference doses and slope factors for ingestion are shown in Table C1.
- The Inhale Factor shown in Table 30 is included in the Hazard Index and Cancer Risk factors. In effect, the hazard index and risk factors are doubled for volatile chemicals (Inhale Factor = 2).
- Missing values are indicated with “na”, which means “not available”.

Table C16. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Surface Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
50-32-8	Benzo[a]pyrene	na	1.18E+01	na	4.72E+00
53-70-3	Dibenz[a,h]anthracene	na	3.54E+01	na	1.42E+01
56-23-5	Carbon tetrachloride	1.79E+02	2.97E-03	8.16E+01	2.97E-03
57-12-5	Cyanide, free	3.13E+00	na	1.43E+00	na
57-14-7	1,1-Dimethylhydrazine	na	3.43E-02	na	3.43E-02
57-55-6	Propylene glycol (1,2-Propanediol)	3.13E-03	na	1.43E-03	na
58-89-9	gamma-Benzene hexachloride (gamma-Lindane)	2.08E+02	2.93E-02	9.52E+01	1.49E-02
60-34-4	Methylhydrazine	na	3.43E-02	na	3.43E-02
60-57-1	Dieldrin	2.21E+04	7.09E+00	8.86E+03	2.83E+00
62-75-9	N-Nitrosodimethylamine	na	5.83E-01	na	5.83E-01
64-18-6	Formic acid	3.13E-02	na	1.43E-02	na
67-56-1	Methanol (Methyl alcohol)	2.50E-01	na	1.14E-01	na
67-64-1	Acetone (2-Propanone)	1.25E+00	na	5.71E-01	na
67-66-3	Chloroform	1.25E+01	2.29E-05	5.71E+00	2.29E-05
71-36-3	n-Butyl alcohol (n-Butanol)	6.25E-01	na	2.86E-01	na
71-43-2	Benzene	3.13E+01	1.26E-03	1.43E+01	1.26E-03
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	6.25E-01	na	2.86E-01	na
72-20-8	Endrin	2.59E+03	na	1.04E+03	na
74-83-9	Bromomethane	8.93E+01	na	4.08E+01	na
74-87-3	Methyl chloride (Chloromethane)	2.43E+00	na	1.11E+00	na
75-00-3	Ethyl Chloride	1.09E-02	na	5.00E-03	na
75-01-4	Vinyl chloride (Chloroethylene)	4.17E+01	3.20E-02	1.90E+01	1.60E-02
75-05-8	Acetonitrile	3.65E+00	na	1.67E+00	na
75-07-0	Acetaldehyde	2.43E+01	8.80E-05	1.11E+01	8.80E-05
75-09-2	Dichloromethane (Methylene chloride)	2.08E+00	1.71E-04	9.52E-01	1.71E-04
75-15-0	Carbon disulfide	1.25E+00	na	5.71E-01	na
75-21-8	Ethylene Oxide (Oxirane)	na	2.33E-02	na	2.33E-02
75-34-3	1,1-Dichloroethane (Ethylidene chloride)	1.25E+00	na	5.71E-01	na
75-35-4	1,1-Dichloroethylene	2.50E+00	na	1.14E+00	na
75-45-6	Chlorodifluoromethane	4.37E-03	na	2.00E-03	na
75-68-3	Chloro-1,1-difluoroethane, 1-	4.37E-03	na	2.00E-03	na
75-69-4	Trichlorofluoromethane	4.17E-01	na	1.90E-01	na
75-71-8	Dichlorodifluoromethane	6.25E-01	na	2.86E-01	na
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	2.08E-03	na	9.52E-04	na
76-44-8	Heptachlor	7.66E+03	6.90E+00	3.06E+03	2.76E+00
78-87-5	1,2-Dichloropropane	4.17E-01	na	1.90E-01	na
78-93-3	Methyl ethyl ketone (2-Butanone)	2.08E-01	na	9.52E-02	na
79-00-5	1,1,2-Trichloroethane	3.13E+01	1.30E-03	1.43E+01	1.30E-03
79-01-6	Trichloroethylene	2.08E+01	2.51E-04	9.52E+00	2.51E-04

Table C16. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Surface Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
79-10-7	2-Propenoic acid (Acrylic acid)	1.25E-01	na	5.71E-02	na
79-34-5	1,1,2,2-Tetrachloroethane (Acetylene tetrachloride)	na	4.57E-03	na	4.57E-03
82-68-8	Pentachloronitrobenzene (PCNB)	9.59E+01	2.99E-02	3.84E+01	1.20E-02
83-32-9	Acenaphthene	1.34E+00	na	5.35E-01	na
84-66-2	Diethyl phthalate	7.81E-02	na	3.57E-02	na
84-74-2	Dibutyl phthalate	2.25E+00	na	8.98E-01	na
85-68-7	Butyl benzyl phthalate	1.69E+00	na	6.75E-01	na
87-68-3	Hexachlorobutadiene	3.69E+03	2.30E-02	1.48E+03	9.21E-03
87-86-5	Pentachlorophenol	8.94E+00	1.29E-02	3.58E+00	5.15E-03
88-06-2	2,4,6-Trichlorophenol	na	1.26E-04	na	1.26E-04
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	6.25E+01	na	2.86E+01	na
91-20-3	Naphthalene	6.25E+00	na	2.86E+00	na
92-52-4	1,1'-Biphenyl	1.79E+00	na	7.14E-01	na
95-50-1	1,2-Dichlorobenzene (ortho-)	1.39E+00	na	6.35E-01	na
95-63-6	1,2,4-Trimethylbenzene	2.50E+00	na	1.14E+00	na
98-86-2	Acetophenone	6.25E-01	na	2.86E-01	na
98-95-3	Nitrobenzene	1.25E+02	na	5.71E+01	na
100-25-4	1,4-Dinitrobenzene (para-)	1.56E+02	na	7.14E+01	na
100-41-4	Ethyl benzene	1.25E+00	na	5.71E-01	na
100-42-5	Styrene	6.25E-01	na	2.86E-01	na
100-51-6	Benzyl alcohol	2.08E-01	na	9.52E-02	na
106-46-7	1,4-Dichlorobenzene (para-)	2.73E-01	6.58E-04	1.25E-01	5.49E-04
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.09E+03	1.94E+00	5.00E+02	1.94E+00
106-99-0	1,3-Butadiene	5.47E+01	6.00E-04	2.50E+01	6.00E-04
107-02-8	Acrolein	2.50E+02	na	1.14E+02	na
107-05-1	3-Chloropropene (Allyl chloride)	1.25E+00	na	5.71E-01	na
107-06-2	1,2-Dichloroethane (Ethylene chloride)	na	2.08E-03	na	2.08E-03
107-13-1	Acrylonitrile	1.25E+02	1.23E-02	5.71E+01	1.23E-02
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	7.29E-02	na	3.33E-02	na
108-67-8	1,3,5-Trimethylbenzene	2.50E+00	na	1.14E+00	na
108-87-2	Methyl cyclohexane	7.29E-02	na	3.33E-02	na
108-88-3	Toluene (Methyl benzene)	6.25E-01	na	2.86E-01	na
108-90-7	Chlorobenzene	6.25E+00	na	2.86E+00	na
108-94-1	Cyclohexanone	1.25E-02	na	5.71E-03	na
108-95-2	Phenol (Carbolic acid)	2.08E-01	na	9.52E-02	na
110-00-9	Furan (Oxacyclopentadiene)	6.25E+01	na	2.86E+01	na
110-54-3	n-Hexane	2.58E+00	na	1.03E+00	na
110-86-1	Pyridine	6.25E+01	na	2.86E+01	na
111-76-2	2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	2.50E-01	na	1.14E-01	na

Table C16. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Surface Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
111-90-0	2-(2-Ethoxyethoxy)-ethanol (Diethylene Glycol Monoethyl Ether)	6.25E-02	na	2.86E-02	na
117-81-7	Di (2-ethylhexyl) phthalate (DEHP)	5.93E+00	6.64E-04	2.37E+00	2.66E-04
117-84-0	Di-n-octylphthalate	3.13E+00	na	1.43E+00	na
118-74-1	Hexachlorobenzene	2.48E+03	1.27E+00	9.94E+02	5.09E-01
120-82-1	1,2,4-Trichlorobenzene	1.92E+01	na	7.67E+00	na
121-44-8	Triethylamine	1.56E+01	na	7.14E+00	na
122-39-4	Diphenylamine	2.50E+00	na	1.14E+00	na
123-91-1	1,4-Dioxane (Diethylene oxide)	na	1.26E-04	na	1.26E-04
126-73-8	Tributyl Phosphate	3.13E-01	6.17E-05	1.43E-01	6.17E-05
126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	6.25E+02	na	2.86E+02	na
127-18-4	1,1,2,2-Tetrachloroethylene	1.25E+01	1.33E-03	5.71E+00	1.19E-03
141-78-6	Ethyl acetate (Acetic acid, ethyl ester)	6.94E-02	na	3.17E-02	na
156-59-2	cis-1,2-Dichloroethylene	1.25E+01	na	5.71E+00	na
206-44-0	Fluoranthene (1,2-Benzacenaphthene)	1.81E+01	na	7.24E+00	na
309-00-2	Aldrin	2.60E+05	5.29E+01	1.04E+05	2.12E+01
319-84-6	alpha-Benzene hexachloride (alpha-Lindane)	na	1.64E-01	na	7.20E-02
319-85-7	beta-Benzene hexachloride (beta-Lindane)	na	4.51E-02	na	2.06E-02
621-64-7	N-Nitrosodi-N-propylamine	na	8.00E-02	na	8.00E-02
1314-62-1	Vanadium pentoxide	8.57E+00	na	3.43E+00	na
1330-20-7	Xylenes (mixtures)	6.25E-01	na	2.86E-01	na
1336-36-3	Polychlorinated Biphenyls (high risk)	na	1.79E+01	na	7.16E+00
1336-36-3	Polychlorinated Biphenyls (low risk)	na	3.58E+00	na	1.43E+00
1336-36-3	Polychlorinated Biphenyls (lowest risk)	na	6.26E-01	na	2.50E-01
6533-73-9	Thallium carbonate	4.82E+04	na	1.93E+04	na
7429-90-5	Aluminum	1.93E-01	na	7.71E-02	na
7439-96-5	Manganese	1.34E+00	na	6.12E-01	na
7439-98-7	Molybdenum	1.25E+01	na	5.71E+00	na
7440-02-0	Nickel (soluble salts)	3.13E+00	na	1.43E+00	na
7440-22-4	Silver	1.25E+01	na	5.71E+00	na
7440-24-6	Strontium, Stable	1.04E-01	na	4.76E-02	na
7440-31-5	Tin	1.93E+00	na	7.71E-01	na
7440-36-0	Antimony	1.56E+02	na	7.14E+01	na
7440-38-2	Arsenic (inorganic)	3.14E+02	5.65E-02	1.25E+02	2.26E-02
7440-39-3	Barium	8.93E-01	na	4.08E-01	na
7440-41-7	Beryllium and compounds	3.13E+01	6.48E-02	1.43E+01	4.80E-02
7440-42-8	Boron and borates only	6.94E-01	na	3.17E-01	na
7440-43-9	Cadmium	1.25E+02	na	5.71E+01	na
7440-48-4	Cobalt	5.79E+00	2.27E-01	2.31E+00	9.07E-02
7440-66-6	Zinc and compounds	3.24E-01	na	1.30E-01	na
7487-94-7	Mercuric chloride	1.29E+03	na	5.14E+02	na

Table C16. Hazard Index and Cancer Risk Factors for Chemicals Under the MTCA for Surface Water.

CASRN	Chemical Name	Method B (Residential) per mg/L		Method C (Industrial) per mg/L	
		Hazard Index	Increased Cancer Risk	Hazard Index	Increased Cancer Risk
7664-41-7	Ammonia	2.19E+00	na	9.99E-01	na
7723-14-0	Phosphorus, white	2.89E+04	na	1.16E+04	na
7782-41-4	Fluorine (soluble fluoride)	1.04E+00	na	4.76E-01	na
7782-49-2	Selenium and compounds	1.31E+01	na	5.71E+00	na
8001-35-2	Toxaphene	na	9.56E-01	na	3.82E-01
14797-55-8	Nitrate	3.91E-02	na	1.79E-02	na
14797-65-0	Nitrite	6.25E-01	na	2.86E-01	na
16065-83-1	Chromium (III) (insoluble salts)	5.14E-02	na	2.06E-02	na
18540-29-9	Chromium (VI) (soluble salts)	2.57E+01	na	1.03E+01	na
none	Uranium (soluble salts)	1.04E+02	na	4.76E+01	na

Notes:

- CASRN = Chemical Abstract Service Reference Number
- The fish bioaccumulation factors are shown in Table A35. The reference doses and slope factors for ingestion are shown in Table C1. The larger of the drinking water and fish are shown in this table.
- The Inhale Factor shown in Table 30 is included in the Hazard Index and Cancer Risk factors. In effect, the hazard index and risk factors are doubled for volatile chemicals (Inhale Factor = 2).
- Missing values are indicated with “na”, which means “not available”.

REFERENCES

EPA-540/R95/128, 1996, *Soil Screening Guidances: Technical Background Document*, U.S. Environmental Protection Agency, Washington, DC.

IRIS Database, June, 2003, U.S. Environmental Protection Agency, internet address:
<http://www.epa.gov/iris/>

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APPENDIX D

PATHWAY DOSE FACTORS FOR SELECTED EXPOSURE SCENARIOS

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Pathway Dose Factors for the Post-Intrusion Residents

This appendix lists the doses for each radionuclide by pathway. This information is useful for checking the calculations. Table D1 shows the doses for the Suburban Garden Scenario. The pathways of interest are soil inhalation, soil ingestion, garden produce ingestion, and external dose. Table D2 shows the doses for the Rural Pasture Scenario. This scenario replaces the garden vegetable pathway with cow milk.

Table D1. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
H-3	3.04E+00	0.00E+00	3.04E+00	2.89E+00	1.74E-03	1.52E-01
Be-10	1.24E+01	9.66E-01	1.14E+01	6.31E+00	3.73E+00	1.37E+00
C-14	6.22E+02	1.21E-02	6.22E+02	6.20E+02	1.65E+00	7.89E-03
Na-22	1.14E+04	1.01E+04	1.36E+03	1.35E+03	8.60E+00	2.60E-02
Al-26	1.32E+04	1.32E+04	2.48E+01	1.31E+01	1.17E+01	5.64E-02
Si-32+D	4.13E+02	1.02E+01	4.03E+02	3.90E+02	8.77E+00	3.96E+00
Cl-36	8.26E+04	1.90E+00	8.26E+04	8.26E+04	2.20E+00	7.32E-02
K-40	5.29E+03	7.71E+02	4.52E+03	4.51E+03	1.47E+01	4.72E-02
Ca-41	2.61E+02	0.00E+00	2.61E+02	2.60E+02	1.01E+00	4.83E-03
Ti-44+D	1.08E+04	1.08E+04	6.76E+01	4.63E+01	1.96E+01	1.73E+00
V-49	1.31E-01	0.00E+00	1.31E-01	8.93E-02	4.10E-02	9.39E-04
Mn-54	3.59E+03	3.36E+03	2.36E+02	2.34E+02	1.82E+00	1.77E-02
Fe-55	1.72E+00	0.00E+00	1.72E+00	1.26E+00	4.56E-01	4.58E-03
Fe-60+D	9.13E+02	4.15E+02	4.97E+02	3.74E+02	1.23E+02	1.05E+00
Co-60	1.25E+04	1.19E+04	5.85E+02	5.65E+02	2.08E+01	1.20E-01
Ni-59	5.70E+00	0.00E+00	5.70E+00	5.53E+00	1.68E-01	3.55E-03
Ni-63	1.56E+01	0.00E+00	1.56E+01	1.52E+01	4.61E-01	8.86E-03
Se-79	1.00E+02	1.61E-02	1.00E+02	9.33E+01	6.61E+00	2.34E-02
Rb-87	1.91E+03	1.28E-01	1.91E+03	1.90E+03	3.93E+00	1.25E-02
Sr-90+D	3.57E+04	2.09E+01	3.57E+04	3.56E+04	1.22E+02	9.43E-01
Zr-93	3.36E+00	1.01E-03	3.36E+00	1.70E+00	1.33E+00	3.22E-01
Nb-91	1.49E+01	1.03E+01	4.53E+00	4.10E+00	4.17E-01	1.24E-02
Nb-93m	4.56E+00	9.40E-02	4.46E+00	4.04E+00	4.13E-01	1.21E-02
Nb-94	7.78E+03	7.72E+03	6.20E+01	5.61E+01	5.71E+00	1.39E-01
Mo-93	4.60E+02	5.31E-01	4.59E+02	4.58E+02	1.07E+00	1.08E-01
Tc-99	5.06E+03	1.09E-01	5.06E+03	5.06E+03	1.11E+00	2.98E-02
Ru-106+D	1.35E+03	8.89E+02	4.64E+02	4.45E+02	1.86E+01	3.31E-01
Pd-107	3.10E+00	0.00E+00	3.10E+00	2.93E+00	1.19E-01	4.93E-02
Ag-108m+D	7.86E+03	7.85E+03	1.39E+01	7.70E+00	6.08E+00	9.74E-02
Cd-109	7.99E+02	1.17E+01	7.87E+02	7.77E+02	9.16E+00	3.39E-01
Cd-113m	1.15E+04	5.75E-01	1.15E+04	1.14E+04	1.27E+02	5.76E+00
In-115	2.67E+02	3.62E-01	2.66E+02	1.26E+02	1.26E+02	1.45E+01
Sn-121m+D	1.17E+01	1.92E+00	9.82E+00	7.98E+00	1.79E+00	4.57E-02
Sn-126+D	9.74E+03	9.65E+03	9.20E+01	7.48E+01	1.68E+01	3.90E-01
Sb-125	1.92E+03	1.90E+03	2.85E+01	2.59E+01	2.49E+00	4.62E-02

Table D1. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
Te-125m	9.28E+00	5.61E+00	3.67E+00	2.47E+00	1.19E+00	6.37E-03
I-129	2.89E+03	1.17E+01	2.87E+03	2.65E+03	2.19E+02	6.65E-01
Cs-134	1.21E+04	7.02E+03	5.10E+03	5.05E+03	5.40E+01	1.52E-01
Cs-135	5.55E+02	3.49E-02	5.55E+02	5.50E+02	5.66E+00	1.76E-02
Cs-137+D	6.63E+03	2.74E+03	3.89E+03	3.85E+03	3.98E+01	1.22E-01
Ba-133	1.71E+03	1.65E+03	5.44E+01	5.17E+01	2.67E+00	2.91E-02
Pm-147	3.24E+00	4.27E-02	3.20E+00	2.28E+00	7.87E-01	1.33E-01
Sm-147	8.77E+02	0.00E+00	8.77E+02	4.41E+02	1.48E+02	2.89E+02
Sm-151	1.35E+00	8.96E-04	1.35E+00	9.24E-01	3.10E-01	1.15E-01
Eu-150	7.11E+03	7.09E+03	2.11E+01	1.51E+01	5.06E+00	1.03E+00
Eu-152	5.44E+03	5.42E+03	2.11E+01	1.52E+01	5.12E+00	8.32E-01
Eu-154	5.92E+03	5.89E+03	3.07E+01	2.21E+01	7.49E+00	1.06E+00
Eu-155	1.65E+02	1.60E+02	4.79E+00	3.46E+00	1.18E+00	1.49E-01
Gd-152	1.45E+03	0.00E+00	1.45E+03	3.84E+02	1.29E+02	9.39E+02
Ho-166m	8.38E+03	8.35E+03	2.87E+01	1.92E+01	6.45E+00	2.99E+00
Re-187	1.64E+00	0.00E+00	1.64E+00	1.63E+00	7.60E-03	2.10E-04
Tl-204	8.60E+00	3.51E+00	5.09E+00	2.51E+00	2.57E+00	8.51E-03
Pb-205	7.47E+00	6.44E-03	7.47E+00	6.15E+00	1.30E+00	1.52E-02
Pb-210+D	2.70E+04	5.37E+00	2.70E+04	2.21E+04	4.78E+03	6.95E+01
Bi-207	7.38E+03	7.36E+03	2.21E+01	1.76E+01	4.36E+00	7.65E-02
Po-209	7.46E+03	1.61E+01	7.44E+03	5.51E+03	1.89E+03	4.12E+01
Po-210	3.33E+03	2.74E-02	3.33E+03	2.32E+03	9.96E+02	1.52E+01
Ra-226+D	1.41E+04	8.60E+03	5.47E+03	4.33E+03	1.10E+03	3.43E+01
Ra-228+D	1.09E+04	5.21E+03	5.71E+03	4.32E+03	1.17E+03	2.22E+02
Ac-227+D	3.13E+04	1.72E+03	2.96E+04	1.12E+04	1.17E+04	6.62E+03
Th-228+D	9.10E+03	6.91E+03	2.18E+03	4.79E+02	5.93E+02	1.11E+03
Th-229+D	1.40E+04	1.34E+03	1.26E+04	2.68E+03	3.22E+03	6.73E+03
Th-230	1.82E+03	2.02E+00	1.82E+03	3.65E+02	4.39E+02	1.01E+03
Th-232	8.82E+03	1.53E+02	8.67E+03	1.99E+03	2.22E+03	4.46E+03
Pa-231	2.14E+04	1.78E+02	2.12E+04	7.60E+03	8.57E+03	5.06E+03
U-232	7.54E+03	6.38E+02	6.90E+03	5.56E+03	1.08E+03	2.64E+02
U-233	1.48E+03	1.25E+00	1.47E+03	1.22E+03	2.28E+02	3.05E+01
U-234	1.44E+03	3.60E-01	1.44E+03	1.19E+03	2.23E+02	2.98E+01
U-235+D	2.02E+03	6.63E+02	1.36E+03	1.12E+03	2.10E+02	2.76E+01
U-236	1.37E+03	1.91E-01	1.37E+03	1.13E+03	2.12E+02	2.81E+01
U-238+D	1.47E+03	1.04E+02	1.37E+03	1.13E+03	2.11E+02	2.67E+01
Np-237+D	3.44E+04	9.46E+02	3.34E+04	2.78E+04	3.54E+03	2.07E+03
Pu-236	2.18E+03	1.24E+00	2.17E+03	7.90E+02	8.85E+02	5.00E+02
Pu-238	6.35E+03	1.37E-01	6.34E+03	2.28E+03	2.55E+03	1.51E+03
Pu-239	7.02E+03	2.59E-01	7.02E+03	2.53E+03	2.83E+03	1.66E+03
Pu-240	7.02E+03	1.34E-01	7.02E+03	2.53E+03	2.83E+03	1.66E+03
Pu-241+D	1.37E+02	3.24E-02	1.37E+02	4.95E+01	5.53E+01	3.25E+01
Pu-242	6.68E+03	1.17E-01	6.68E+03	2.40E+03	2.69E+03	1.59E+03
Pu-244+D	8.21E+03	1.63E+03	6.59E+03	2.37E+03	2.66E+03	1.56E+03
Am-241	7.24E+03	3.99E+01	7.20E+03	2.57E+03	2.91E+03	1.72E+03
Am-242m+D	7.09E+03	5.90E+01	7.03E+03	2.52E+03	2.84E+03	1.67E+03
Am-243+D	7.97E+03	7.96E+02	7.17E+03	2.57E+03	2.90E+03	1.70E+03

Table D1. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
Cm-242	1.58E+02	1.08E-01	1.58E+02	5.22E+01	6.79E+01	3.77E+01
Cm-243	5.39E+03	5.12E+02	4.87E+03	1.71E+03	2.00E+03	1.17E+03
Cm-244	3.91E+03	1.14E-01	3.91E+03	1.37E+03	1.60E+03	9.41E+02
Cm-245	7.62E+03	3.08E+02	7.32E+03	2.56E+03	2.99E+03	1.76E+03
Cm-246	7.24E+03	1.06E-01	7.24E+03	2.54E+03	2.96E+03	1.74E+03
Cm-247+D	8.25E+03	1.57E+03	6.68E+03	2.34E+03	2.74E+03	1.60E+03
Cm-248	2.66E+04	8.01E-02	2.66E+04	9.32E+03	1.09E+04	6.38E+03
Cm-250+D	1.53E+05	1.54E+03	1.52E+05	5.33E+04	6.22E+04	3.63E+04
Bk-247	9.69E+03	3.85E+02	9.30E+03	3.33E+03	3.76E+03	2.22E+03
Cf-248	1.62E+03	9.56E-02	1.62E+03	1.25E+03	2.36E+02	1.35E+02
Cf-249	3.06E+04	1.57E+03	2.90E+04	2.30E+04	3.79E+03	2.23E+03
Cf-250	1.28E+04	1.07E-01	1.28E+04	1.01E+04	1.68E+03	9.86E+02
Cf-251	3.02E+04	4.71E+02	2.97E+04	2.35E+04	3.88E+03	2.27E+03
Cf-252	6.04E+03	1.50E-01	6.04E+03	4.77E+03	8.10E+02	4.66E+02

Notes:

- The individual inhales 87 mg/y, ingests 18 g/y, and is exposed for 180 h/y to an external dose rate corresponding to the center of a 100 m² garden. The individual obtains 25% of his vegetables from the garden.
- “Total” is the sum of the “External” and “Internal” columns. “Internal” is the sum of the “Garden Vegetables”, “Soil Ingestion”, and “Soil Inhalation” columns.

Table D2. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
H-3	1.33E-01	0.00E+00	1.33E-01	1.12E-01	3.49E-05	2.15E-02
Be-10	1.67E-01	3.86E-02	1.28E-01	2.32E-04	7.45E-02	5.31E-02
C-14	1.36E+01	4.83E-04	1.36E+01	1.35E+01	3.29E-02	3.07E-04
Na-22	4.50E+02	4.03E+02	4.74E+01	4.72E+01	1.72E-01	1.01E-03
Al-26	5.28E+02	5.27E+02	3.84E-01	1.48E-01	2.33E-01	2.19E-03
Si-32+D	8.06E-01	4.09E-01	3.97E-01	6.84E-02	1.75E-01	1.54E-01
Cl-36	2.66E+03	7.58E-02	2.66E+03	2.66E+03	4.40E-02	2.85E-03
K-40	1.42E+02	3.08E+01	1.11E+02	1.11E+02	2.94E-01	1.83E-03
Ca-41	1.00E+01	0.00E+00	1.00E+01	1.00E+01	2.01E-02	1.88E-04
Ti-44+D	4.44E+02	4.30E+02	1.32E+01	1.28E+01	3.92E-01	6.74E-02
V-49	9.00E-04	0.00E+00	9.00E-04	4.46E-05	8.19E-04	3.65E-05
Mn-54	1.34E+02	1.34E+02	6.87E-02	3.16E-02	3.64E-02	6.89E-04
Fe-55	1.01E-02	0.00E+00	1.01E-02	8.21E-04	9.12E-03	1.78E-04
Fe-60+D	1.95E+01	1.66E+01	2.84E+00	3.50E-01	2.45E+00	4.08E-02
Co-60	4.80E+02	4.78E+02	2.00E+00	1.58E+00	4.16E-01	4.65E-03
Ni-59	3.23E-01	0.00E+00	3.23E-01	3.19E-01	3.36E-03	1.38E-04
Ni-63	8.83E-01	0.00E+00	8.83E-01	8.73E-01	9.22E-03	3.44E-04
Se-79	2.36E+00	6.45E-04	2.36E+00	2.22E+00	1.32E-01	9.11E-04
Rb-87	4.70E+01	5.12E-03	4.69E+01	4.69E+01	7.86E-02	4.84E-04
Sr-90+D	9.66E+02	8.37E-01	9.65E+02	9.63E+02	2.43E+00	3.66E-02
Zr-93	3.92E-02	4.05E-05	3.92E-02	4.48E-05	2.66E-02	1.25E-02

Table D2. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
Nb-91	4.22E-01	4.13E-01	8.84E-03	1.33E-05	8.34E-03	4.81E-04
Nb-93m	1.25E-02	3.76E-03	8.74E-03	1.30E-05	8.26E-03	4.72E-04
Nb-94	3.09E+02	3.09E+02	1.20E-01	1.81E-04	1.14E-01	5.42E-03
Mo-93	1.65E+00	2.13E-02	1.63E+00	1.61E+00	2.14E-02	4.18E-03
Tc-99	2.54E+01	4.34E-03	2.54E+01	2.54E+01	2.22E-02	1.16E-03
Ru-106+D	3.60E+01	3.56E+01	3.97E-01	1.24E-02	3.71E-01	1.29E-02
Pd-107	2.45E-01	0.00E+00	2.45E-01	2.41E-01	2.38E-03	1.92E-03
Ag-108m+D	3.14E+02	3.14E+02	1.49E-01	2.36E-02	1.22E-01	3.78E-03
Cd-109	5.22E+00	4.70E-01	4.76E+00	4.56E+00	1.83E-01	1.32E-02
Cd-113m	7.59E+01	2.30E-02	7.59E+01	7.31E+01	2.54E+00	2.24E-01
In-115	3.91E+00	1.45E-02	3.89E+00	8.04E-01	2.53E+00	5.62E-01
Sn-121m+D	2.72E-01	7.68E-02	1.95E-01	1.58E-01	3.59E-02	1.78E-03
Sn-126+D	3.88E+02	3.86E+02	1.83E+00	1.48E+00	3.36E-01	1.52E-02
Sb-125	7.59E+01	7.58E+01	8.21E-02	3.04E-02	4.99E-02	1.79E-03
Te-125m	2.70E-01	2.24E-01	4.59E-02	2.18E-02	2.39E-02	2.48E-04
I-129	2.23E+02	4.70E-01	2.22E+02	2.18E+02	4.38E+00	2.59E-02
Cs-134	4.70E+02	2.81E+02	1.89E+02	1.88E+02	1.08E+00	5.91E-03
Cs-135	2.19E+01	1.40E-03	2.19E+01	2.18E+01	1.13E-01	6.83E-04
Cs-137+D	2.62E+02	1.10E+02	1.53E+02	1.52E+02	7.95E-01	4.74E-03
Ba-133	6.65E+01	6.62E+01	3.08E-01	2.53E-01	5.34E-02	1.13E-03
Pm-147	2.36E-02	1.71E-03	2.19E-02	1.02E-03	1.57E-02	5.17E-03
Sm-147	1.44E+01	0.00E+00	1.44E+01	2.06E-01	2.96E+00	1.12E+01
Sm-151	1.12E-02	3.58E-05	1.11E-02	4.31E-04	6.21E-03	4.49E-03
Eu-150	2.84E+02	2.84E+02	1.48E-01	7.01E-03	1.01E-01	3.99E-02
Eu-152	2.17E+02	2.17E+02	1.42E-01	7.02E-03	1.02E-01	3.23E-02
Eu-154	2.36E+02	2.36E+02	2.01E-01	1.02E-02	1.50E-01	4.13E-02
Eu-155	6.44E+00	6.41E+00	3.09E-02	1.58E-03	2.36E-02	5.78E-03
Gd-152	3.92E+01	0.00E+00	3.92E+01	1.79E-01	2.58E+00	3.65E+01
Ho-166m	3.34E+02	3.34E+02	2.54E-01	8.98E-03	1.29E-01	1.16E-01
Re-187	1.71E-02	0.00E+00	1.71E-02	1.69E-02	1.52E-04	8.16E-06
Tl-204	5.04E-01	1.40E-01	3.64E-01	3.12E-01	5.14E-02	3.31E-04
Pb-205	4.96E-02	2.58E-04	4.94E-02	2.27E-02	2.61E-02	5.89E-04
Pb-210+D	1.90E+02	2.15E-01	1.89E+02	9.09E+01	9.57E+01	2.70E+00
Bi-207	2.95E+02	2.94E+02	2.91E-01	2.01E-01	8.72E-02	2.97E-03
Po-209	7.95E+01	6.43E-01	7.88E+01	3.94E+01	3.79E+01	1.60E+00
Po-210	3.47E+01	1.09E-03	3.47E+01	1.42E+01	1.99E+01	5.91E-01
Ra-226+D	5.14E+02	3.44E+02	1.70E+02	1.47E+02	2.20E+01	1.33E+00
Ra-228+D	3.88E+02	2.08E+02	1.80E+02	1.48E+02	2.34E+01	8.63E+00
Ac-227+D	5.76E+02	6.86E+01	5.07E+02	1.47E+01	2.35E+02	2.57E+02
Th-228+D	3.32E+02	2.77E+02	5.51E+01	1.67E-01	1.19E+01	4.31E+01
Th-229+D	3.80E+02	5.36E+01	3.27E+02	9.92E-01	6.45E+01	2.61E+02
Th-230	4.84E+01	8.08E-02	4.83E+01	1.68E-01	8.77E+00	3.94E+01
Th-232	2.34E+02	6.11E+00	2.28E+02	1.03E+01	4.44E+01	1.73E+02
Pa-231	3.78E+02	7.11E+00	3.71E+02	2.88E+00	1.71E+02	1.96E+02
U-232	8.51E+01	2.55E+01	5.96E+01	2.76E+01	2.17E+01	1.03E+01
U-233	1.19E+01	4.99E-02	1.19E+01	6.12E+00	4.55E+00	1.18E+00
U-234	1.16E+01	1.44E-02	1.16E+01	5.99E+00	4.46E+00	1.16E+00

Table D2. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
U-235+D	3.74E+01	2.65E+01	1.09E+01	5.66E+00	4.21E+00	1.07E+00
U-236	1.10E+01	7.66E-03	1.10E+01	5.70E+00	4.24E+00	1.09E+00
U-238+D	1.51E+01	4.16E+00	1.09E+01	5.68E+00	4.22E+00	1.04E+00
Np-237+D	1.91E+02	3.78E+01	1.53E+02	1.66E+00	7.07E+01	8.06E+01
Pu-236	3.73E+01	4.95E-02	3.73E+01	1.87E-01	1.77E+01	1.94E+01
Pu-238	1.10E+02	5.50E-03	1.10E+02	1.68E-01	5.11E+01	5.87E+01
Pu-239	1.21E+02	1.04E-02	1.21E+02	1.87E-01	5.66E+01	6.44E+01
Pu-240	1.21E+02	5.35E-03	1.21E+02	1.87E-01	5.66E+01	6.44E+01
Pu-241+D	2.37E+00	1.30E-03	2.37E+00	3.74E-03	1.11E+00	1.26E+00
Pu-242	1.16E+02	4.67E-03	1.16E+02	1.77E-01	5.38E+01	6.17E+01
Pu-244+D	1.79E+02	6.51E+01	1.14E+02	1.75E-01	5.31E+01	6.05E+01
Am-241	1.27E+02	1.60E+00	1.25E+02	2.63E-01	5.82E+01	6.66E+01
Am-242m+D	1.24E+02	2.36E+00	1.22E+02	3.42E-01	5.67E+01	6.50E+01
Am-243+D	1.56E+02	3.18E+01	1.24E+02	2.63E-01	5.81E+01	6.61E+01
Cm-242	2.88E+00	4.31E-03	2.88E+00	5.60E-02	1.36E+00	1.47E+00
Cm-243	1.08E+02	2.05E+01	8.79E+01	2.40E+00	3.99E+01	4.56E+01
Cm-244	7.05E+01	4.56E-03	7.05E+01	1.92E+00	3.20E+01	3.66E+01
Cm-245	1.44E+02	1.23E+01	1.32E+02	3.63E+00	5.98E+01	6.84E+01
Cm-246	1.31E+02	4.24E-03	1.31E+02	3.59E+00	5.92E+01	6.77E+01
Cm-247+D	1.83E+02	6.29E+01	1.20E+02	3.32E+00	5.47E+01	6.22E+01
Cm-248	4.79E+02	3.20E-03	4.79E+02	1.32E+01	2.18E+02	2.48E+02
Cm-250+D	2.79E+03	6.16E+01	2.73E+03	7.53E+01	1.24E+03	1.41E+03
Bk-247	1.77E+02	1.54E+01	1.62E+02	3.40E-01	7.52E+01	8.62E+01
Cf-248	9.99E+00	3.82E-03	9.98E+00	3.95E-02	4.72E+00	5.23E+00
Cf-249	2.25E+02	6.27E+01	1.63E+02	2.00E-01	7.58E+01	8.66E+01
Cf-250	7.20E+01	4.27E-03	7.20E+01	8.76E-02	3.36E+01	3.83E+01
Cf-251	1.85E+02	1.89E+01	1.66E+02	2.04E-01	7.76E+01	8.83E+01
Cf-252	3.43E+01	6.01E-03	3.43E+01	3.99E-02	1.62E+01	1.81E+01

Notes:

- The individual inhales 169 mg/y, ingests 18 g/y, and is exposed for 360 h/y to an external dose rate corresponding to the center of a 5,000 m² pasture/hay field. The individual obtains 50% of his milk from the cow.
- “Total” is the sum of the “External” and “Internal” columns. “Internal” is the sum of the “Milk”, “Soil Ingestion”, and “Soil Inhalation” columns.

Pathway Dose Factors for the All Pathways Farmer and Native American

This appendix lists the doses for each radionuclide by pathway. This information is useful for checking the calculations. Tables D3a and D3b show the doses for the All Pathways Farmer Scenario. The total shown is for all of the pathways, which matches the total column in Table 13. The pathway dose factors for the Native American Scenario are spread over 3 tables, D4a, D4b, and D4c. The total columns show both the inland well and Columbia River dose factors shown in Table 16.

Table D3a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Veggie
H-3	4.77E-05	3.49E-05	4.61E-06	0.00E+00	0.00E+00	1.81E-10	2.53E-06
Be-10	4.63E-03	2.54E-03	1.91E-05	5.23E-07	1.37E-06	4.66E-07	3.99E-04
C-14	3.49E-01	1.14E-03	1.13E-07	3.05E-09	1.71E-08	2.06E-07	2.29E-04
Na-22	5.37E-02	6.27E-03	4.14E-07	1.02E-08	1.37E-02	1.04E-06	1.08E-03
Al-26	9.43E-02	7.95E-03	7.87E-07	2.16E-08	1.86E-02	1.46E-06	1.25E-03
Si-32+D	8.00E-03	6.00E-03	5.56E-05	1.52E-06	1.44E-05	1.10E-06	9.71E-04
Cl-36	2.54E-02	1.65E-03	1.18E-06	2.97E-08	2.71E-06	2.78E-07	6.93E-03
K-40	9.16E-02	1.01E-02	6.70E-07	1.82E-08	1.09E-03	1.84E-06	1.95E-03
Ca-41	1.32E-03	6.94E-04	6.87E-08	1.86E-09	0.00E+00	1.26E-07	1.27E-04
Ti-44+D	1.69E-01	1.34E-02	2.44E-05	6.64E-07	1.52E-02	2.45E-06	2.11E-03
V-49	8.20E-05	3.35E-05	1.86E-08	3.87E-10	0.00E+00	4.67E-09	5.05E-06
Mn-54	1.05E-02	1.51E-03	3.62E-07	7.36E-09	4.29E-03	2.06E-07	2.45E-04
Fe-55	9.94E-04	3.31E-04	7.24E-08	1.80E-09	0.00E+00	5.52E-08	5.13E-05
Fe-60+D	2.79E-01	8.31E-02	1.46E-05	4.01E-07	8.87E-04	1.54E-05	1.31E-02
Co-60	7.94E-02	1.47E-02	1.79E-06	4.64E-08	1.66E-02	2.56E-06	2.33E-03
Ni-59	4.30E-04	1.14E-04	4.96E-08	1.36E-09	0.00E+00	2.10E-08	1.84E-05
Ni-63	1.18E-03	3.14E-04	1.24E-07	3.39E-09	0.00E+00	5.76E-08	5.06E-05
Se-79	1.78E-02	4.74E-03	3.54E-07	9.25E-09	2.29E-08	8.32E-07	7.52E-04
Rb-87	4.08E-02	2.68E-03	1.74E-07	4.77E-09	1.81E-07	4.92E-07	5.75E-04
Sr-90+D	1.83E-01	8.34E-02	1.33E-05	3.62E-07	2.95E-05	1.52E-05	1.57E-02
Zr-93	2.69E-03	9.05E-04	4.50E-06	1.23E-07	2.22E-09	1.67E-07	1.42E-04
Nb-91	8.92E-04	2.84E-04	1.73E-07	4.74E-09	1.46E-05	5.22E-08	4.50E-05
Nb-93m	8.46E-04	2.84E-04	1.73E-07	4.66E-09	1.32E-07	5.14E-08	4.49E-05
Nb-94	4.63E-02	3.89E-03	1.95E-06	5.33E-08	1.09E-02	7.14E-07	6.16E-04
Mo-93	1.16E-03	7.36E-04	1.53E-06	4.15E-08	7.53E-07	1.34E-07	1.53E-04
Tc-99	1.85E-03	7.96E-04	4.50E-07	1.18E-08	1.54E-07	1.40E-07	3.62E-04
Ru-106+D	3.87E-02	1.49E-02	6.37E-06	1.36E-07	1.15E-03	2.13E-06	2.29E-03
Pd-107	2.03E-04	8.12E-05	6.91E-07	1.89E-08	0.00E+00	1.49E-08	1.30E-05
Ag-108m+D	3.93E-02	4.15E-03	1.37E-06	3.73E-08	1.11E-02	7.61E-07	6.53E-04
Cd-109	1.81E-02	7.14E-03	6.16E-06	1.37E-07	1.55E-05	1.07E-06	1.15E-03
Cd-113m	2.24E-01	8.77E-02	8.26E-05	2.22E-06	8.07E-07	1.58E-05	1.46E-02
In-115	5.21E+01	8.61E-02	2.02E-04	5.53E-06	5.11E-07	1.58E-05	1.35E-02
Sn-121m+D	2.68E-02	1.23E-03	6.43E-07	1.75E-08	2.71E-06	2.24E-07	1.93E-04
Sn-126+D	2.94E-01	1.14E-02	5.45E-06	1.49E-07	1.36E-02	2.10E-06	1.80E-03
Sb-125	6.60E-03	1.53E-03	6.59E-07	1.80E-08	2.59E-03	3.11E-07	2.52E-04
Te-125m	7.60E-03	2.00E-03	3.94E-07	3.14E-09	5.68E-06	1.07E-07	2.57E-04

Table D3a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Veggie
I-129	5.62E-01	1.50E-01	9.40E-06	2.56E-07	1.66E-05	2.75E-05	2.38E-02
Cs-134	6.37E-01	3.99E-02	2.50E-06	6.03E-08	9.49E-03	6.46E-06	6.55E-03
Cs-135	6.10E-02	3.85E-03	2.46E-07	6.73E-09	4.93E-08	7.08E-07	6.48E-04
Cs-137+D	4.42E-01	2.73E-02	1.72E-06	4.67E-08	3.86E-03	4.96E-06	4.58E-03
Ba-133	7.43E-03	1.85E-03	4.22E-07	1.12E-08	2.32E-03	3.31E-07	2.94E-04
Pm-147	8.49E-04	5.72E-04	2.12E-06	5.24E-08	5.82E-08	9.50E-08	8.87E-05
Sm-147	1.52E-01	1.01E-01	4.03E-03	1.10E-04	0.00E+00	1.85E-05	1.59E-02
Sm-151	3.12E-04	2.12E-04	1.62E-06	4.42E-08	1.26E-09	3.88E-08	3.34E-05
Eu-150	3.41E-02	3.47E-03	1.45E-05	3.93E-07	9.99E-03	6.32E-07	5.45E-04
Eu-152	2.39E-02	3.53E-03	1.19E-05	3.20E-07	7.60E-03	6.36E-07	5.54E-04
Eu-154	2.59E-02	5.20E-03	1.54E-05	4.10E-07	8.23E-03	9.27E-07	8.16E-04
Eu-155	1.73E-03	8.34E-04	2.24E-06	5.78E-08	2.22E-04	1.45E-07	1.30E-04
Gd-152	1.38E-01	8.77E-02	1.31E-02	3.59E-04	0.00E+00	1.61E-05	1.38E-02
Ho-166m	4.40E-02	4.40E-03	4.17E-05	1.14E-06	1.18E-02	8.08E-07	6.92E-04
Re-187	1.22E-05	5.18E-06	2.94E-09	8.03E-11	0.00E+00	9.51E-10	9.38E-07
Tl-204	1.15E-01	1.83E-03	1.30E-07	3.32E-09	4.83E-06	3.14E-07	2.85E-04
Pb-205	2.70E-03	8.88E-04	2.12E-07	5.80E-09	9.10E-09	1.63E-07	1.40E-04
Pb-210+D	8.98E+00	2.93E+00	7.34E-04	2.57E-05	7.56E-06	6.18E-04	4.76E-01
Bi-207	3.32E-02	2.99E-03	1.08E-06	2.93E-08	1.04E-02	5.44E-07	4.70E-04
Po-209	2.40E+00	1.29E+00	5.78E-04	1.58E-05	2.27E-05	2.37E-04	2.03E-01
Po-210	1.84E+00	1.04E+00	4.63E-04	6.82E-06	3.17E-08	1.02E-04	1.48E-01
Ra-226+D	1.23E+00	7.25E-01	4.64E-04	1.30E-05	1.22E-02	1.40E-04	1.15E-01
Ra-228+D	1.31E+00	7.85E-01	2.62E-04	6.96E-05	7.68E-03	1.48E-04	1.24E-01
Ac-227+D	1.07E+01	8.07E+00	9.40E-02	2.54E-03	2.41E-03	1.46E-03	1.27E+00
Th-228+D	8.09E-01	4.42E-01	1.85E-02	4.41E-04	9.31E-03	7.08E-05	6.81E-02
Th-229+D	3.98E+00	2.20E+00	9.40E-02	2.57E-03	1.89E-03	4.03E-04	3.45E-01
Th-230	5.42E-01	2.99E-01	1.41E-02	3.87E-04	3.59E-06	5.49E-05	4.70E-02
Th-232	2.72E+00	1.49E+00	6.21E-02	1.70E-03	3.47E-04	2.80E-04	2.35E-01
Pa-231	7.14E+00	5.78E+00	6.91E-02	1.92E-03	2.62E-04	1.08E-03	9.11E-01
U-232	9.78E-01	7.14E-01	8.05E-04	8.55E-05	1.35E-03	1.39E-04	1.14E-01
U-233	2.13E-01	1.58E-01	4.31E-04	1.17E-05	1.79E-06	2.86E-05	2.48E-02
U-234	2.08E-01	1.54E-01	4.26E-04	1.15E-05	5.09E-07	2.79E-05	2.43E-02
U-235+D	1.99E-01	1.46E-01	3.94E-04	1.06E-05	9.38E-04	2.64E-05	2.30E-02
U-236	1.98E-01	1.47E-01	4.02E-04	1.08E-05	2.71E-07	2.66E-05	2.31E-02
U-238+D	1.98E-01	1.46E-01	3.81E-04	1.03E-05	1.47E-04	2.65E-05	2.30E-02
Np-237+D	3.22E+00	2.42E+00	2.92E-02	7.95E-04	1.34E-03	4.43E-04	3.82E-01
Pu-236	8.27E-01	6.38E-01	7.83E-03	1.96E-04	3.78E-06	1.07E-04	9.89E-02
Pu-238	2.27E+00	1.74E+00	2.12E-02	5.78E-04	1.94E-07	3.19E-04	2.74E-01
Pu-239	2.51E+00	1.93E+00	2.32E-02	6.34E-04	3.66E-07	3.54E-04	3.03E-01
Pu-240	2.51E+00	1.93E+00	2.32E-02	6.34E-04	1.89E-07	3.54E-04	3.03E-01
Pu-241+D	4.86E-02	3.73E-02	4.46E-04	1.24E-05	5.79E-08	6.96E-06	5.88E-03
Pu-242	2.38E+00	1.83E+00	2.22E-02	6.08E-04	1.65E-07	3.36E-04	2.88E-01
Pu-244+D	2.36E+00	1.81E+00	2.18E-02	5.96E-04	2.30E-03	3.32E-04	2.84E-01
Am-241	2.58E+00	1.98E+00	2.40E-02	6.56E-04	5.64E-05	3.64E-04	3.12E-01
Am-242m+D	2.50E+00	1.92E+00	2.30E-02	6.38E-04	8.33E-05	3.56E-04	3.02E-01
Am-243+D	2.58E+00	1.98E+00	2.38E-02	6.51E-04	1.12E-03	3.63E-04	3.11E-01

Table D3a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Veggie
Cm-242	8.09E-02	6.27E-02	9.34E-04	1.62E-05	1.28E-07	7.40E-06	9.18E-03
Cm-243	1.78E+00	1.37E+00	1.66E-02	4.50E-04	7.20E-04	2.49E-04	2.15E-01
Cm-244	1.43E+00	1.10E+00	1.34E-02	3.61E-04	1.60E-07	1.99E-04	1.73E-01
Cm-245	2.66E+00	2.04E+00	2.46E-02	6.73E-04	4.35E-04	3.75E-04	3.20E-01
Cm-246	2.63E+00	2.02E+00	2.44E-02	6.67E-04	1.50E-07	3.70E-04	3.17E-01
Cm-247+D	2.43E+00	1.86E+00	2.24E-02	6.12E-04	2.22E-03	3.42E-04	2.93E-01
Cm-248	9.65E+00	7.41E+00	8.91E-02	2.44E-03	1.13E-07	1.36E-03	1.17E+00
Cm-250+D	5.51E+01	4.23E+01	5.08E-01	1.39E-02	2.17E-03	7.78E-03	6.66E+00
Bk-247	3.40E+00	2.56E+00	3.10E-02	8.49E-04	5.44E-04	4.70E-04	4.03E-01
Cf-248	2.63E-01	1.82E-01	2.40E-03	5.41E-05	1.24E-07	2.78E-05	2.79E-02
Cf-249	3.82E+00	2.58E+00	3.12E-02	8.52E-04	2.21E-03	4.74E-04	4.08E-01
Cf-250	1.71E+00	1.16E+00	1.41E-02	3.79E-04	1.50E-07	2.09E-04	1.83E-01
Cf-251	3.90E+00	2.64E+00	3.18E-02	8.69E-04	6.66E-04	4.85E-04	4.17E-01
Cf-252	8.60E-01	5.89E-01	7.40E-03	1.83E-04	2.05E-07	9.78E-05	9.15E-02

The "Total" column is the sum of all the pathways shown in Table D3a and D3b.

Table D3b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
H-3	1.36E-06	3.13E-06	6.55E-07	3.34E-07	5.97E-12	0.00E+00	2.11E-07
Be-10	7.67E-05	2.61E-07	5.09E-05	1.18E-06	7.38E-06	3.01E-06	1.53E-03
C-14	1.74E-03	1.41E-03	2.44E-04	8.47E-05	1.90E-06	2.19E-08	3.44E-01
Na-22	1.43E-02	1.10E-02	3.17E-06	8.80E-04	3.33E-06	6.12E-03	3.03E-04
Al-26	3.60E-04	1.82E-04	1.19E-04	1.47E-04	2.35E-05	4.17E-02	2.40E-02
Si-32+D	7.36E-06	1.39E-05	6.09E-05	1.13E-04	1.52E-05	2.79E-05	7.24E-04
Cl-36	4.19E-03	1.18E-02	9.21E-06	2.84E-04	6.08E-07	8.23E-07	4.98E-04
K-40	6.42E-03	8.69E-03	2.12E-04	2.45E-04	1.98E-05	1.63E-03	6.12E-02
Ca-41	4.92E-05	2.72E-04	1.59E-06	7.37E-06	1.30E-06	0.00E+00	1.68E-04
Ti-44+D	1.21E-02	1.53E-02	2.69E-06	9.32E-07	3.41E-05	2.94E-02	8.09E-02
V-49	2.07E-06	6.64E-08	3.34E-07	6.18E-07	6.45E-09	0.00E+00	4.04E-05
Mn-54	1.89E-05	4.54E-06	3.85E-06	2.14E-06	2.69E-07	7.79E-04	3.65E-03
Fe-55	1.86E-04	1.08E-06	1.65E-05	7.66E-06	1.87E-07	0.00E+00	3.99E-04
Fe-60+D	5.03E-02	2.98E-04	4.16E-03	1.93E-03	2.73E-04	2.48E-02	1.00E-01
Co-60	4.32E-03	4.94E-04	1.48E-03	3.42E-05	1.44E-05	1.30E-02	2.66E-02
Ni-59	1.73E-05	2.10E-04	5.75E-09	2.66E-07	3.38E-07	0.00E+00	6.91E-05
Ni-63	4.75E-05	5.76E-04	1.58E-08	7.31E-07	8.66E-07	0.00E+00	1.90E-04
Se-79	2.15E-03	2.17E-03	2.14E-03	9.89E-04	3.24E-06	1.24E-08	4.87E-03
Rb-87	8.46E-04	3.82E-03	2.79E-04	1.93E-04	7.32E-06	3.75E-07	3.24E-02
Sr-90+D	2.30E-02	2.99E-02	3.76E-04	4.35E-04	1.89E-04	5.12E-05	3.02E-02
Zr-93	2.73E-08	5.70E-08	2.72E-09	4.20E-09	2.93E-06	9.88E-08	1.64E-03
Nb-91	2.58E-09	1.33E-08	4.28E-09	6.60E-09	8.10E-07	3.15E-05	5.15E-04
Nb-93m	2.55E-09	1.32E-08	4.28E-09	6.60E-09	5.46E-07	1.95E-07	5.15E-04

Table D3b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Nb-94	3.53E-08	1.83E-07	5.85E-08	9.02E-08	1.12E-05	2.38E-02	7.05E-03
Mo-93	2.31E-05	1.48E-04	3.81E-05	1.59E-05	1.45E-06	1.06E-06	4.44E-05
Tc-99	2.31E-05	1.04E-04	9.88E-06	4.57E-04	5.44E-07	8.36E-08	9.61E-05
Ru-106+D	1.90E-02	4.98E-06	1.80E-04	1.74E-06	3.16E-06	2.38E-04	9.01E-04
Pd-107	9.88E-06	9.34E-05	1.23E-09	7.57E-09	2.22E-07	0.00E+00	4.90E-06
Ag-108m+D	3.75E-04	2.37E-05	4.16E-04	4.81E-05	1.11E-05	2.25E-02	1.25E-04
Cd-109	7.63E-05	7.49E-04	2.91E-04	1.68E-05	1.86E-06	3.76E-06	8.62E-03
Cd-113m	1.07E-03	1.02E-02	3.60E-03	2.08E-04	1.56E-04	1.11E-06	1.06E-01
In-115	2.08E-02	9.85E-04	1.29E-03	1.60E-03	2.54E-04	1.14E-06	5.20E+01
Sn-121m+D	2.95E-03	1.40E-04	1.23E-05	2.28E-05	3.18E-06	5.35E-06	2.22E-02
Sn-126+D	2.77E-02	1.31E-03	1.15E-04	2.12E-04	3.37E-05	3.04E-02	2.07E-01
Sb-125	5.92E-05	1.39E-05	6.23E-07	3.11E-06	1.13E-06	1.22E-03	9.24E-04
Te-125m	1.60E-04	5.81E-05	5.94E-05	2.29E-04	6.62E-08	4.89E-07	4.83E-03
I-129	1.82E-01	1.59E-01	7.55E-05	1.05E-02	3.35E-04	2.82E-05	3.63E-02
Cs-134	5.63E-02	3.44E-02	4.06E-03	3.76E-04	1.71E-05	3.50E-03	4.82E-01
Cs-135	5.95E-03	3.55E-03	3.94E-04	3.64E-05	1.14E-05	1.10E-07	4.65E-02
Cs-137+D	4.18E-02	2.50E-02	2.78E-03	2.57E-04	6.41E-05	6.94E-03	3.29E-01
Ba-133	1.11E-05	1.01E-04	8.40E-07	3.89E-05	2.84E-06	2.76E-03	4.47E-05
Pm-147	8.05E-05	1.24E-06	5.73E-08	2.65E-07	3.11E-07	2.65E-08	1.04E-04
Sm-147	1.52E-02	2.31E-04	2.02E-05	1.64E-05	2.93E-04	0.00E+00	1.52E-02
Sm-151	3.19E-05	4.84E-07	4.25E-08	3.44E-08	5.70E-07	2.59E-09	3.20E-05
Eu-150	5.21E-04	7.90E-06	6.95E-07	5.62E-07	8.41E-06	1.85E-02	1.05E-03
Eu-152	5.26E-04	8.00E-06	7.08E-07	5.73E-07	6.39E-06	1.06E-02	1.07E-03
Eu-154	7.69E-04	1.17E-05	1.04E-06	8.44E-07	7.50E-06	9.27E-03	1.57E-03
Eu-155	1.21E-04	1.85E-06	1.67E-07	1.35E-07	7.71E-07	1.65E-04	2.52E-04
Gd-152	9.27E-03	2.01E-04	1.76E-05	1.42E-05	2.58E-04	0.00E+00	1.32E-02
Ho-166m	5.97E-04	1.01E-05	8.82E-07	7.14E-07	1.27E-05	2.58E-02	6.64E-04
Re-187	1.35E-06	9.45E-07	1.10E-08	5.11E-08	1.45E-08	0.00E+00	3.75E-06
Tl-204	2.10E-03	4.04E-04	2.75E-05	3.39E-05	1.41E-06	3.02E-06	1.11E-01
Pb-205	1.07E-05	2.54E-05	8.90E-06	1.65E-05	2.63E-06	2.04E-08	1.61E-03
Pb-210+D	9.22E-02	9.39E-02	2.97E-02	5.56E-02	8.63E-03	1.28E-05	5.30E+00
Bi-207	3.59E-05	1.70E-04	1.50E-05	5.54E-05	7.12E-06	1.89E-02	1.80E-04
Po-209	1.95E-01	5.02E-02	5.82E-02	2.10E-01	3.56E-03	4.75E-05	3.90E-01
Po-210	9.87E-02	2.95E-02	4.63E-02	1.67E-01	8.17E-05	3.53E-09	3.13E-01
Ra-226+D	2.04E-02	1.09E-01	1.10E-03	2.31E-05	5.11E-03	2.69E-02	2.19E-01
Ra-228+D	2.07E-02	1.14E-01	1.18E-03	4.07E-07	1.32E-03	1.39E-02	2.37E-01
Ac-227+D	6.03E-03	1.83E-02	1.62E-03	3.74E-04	1.75E-02	4.02E-03	1.22E+00
Th-228+D	7.26E-05	2.35E-04	8.84E-05	2.04E-05	1.76E-04	3.22E-03	2.67E-01
Th-229+D	3.98E-04	1.26E-03	4.40E-04	1.02E-04	6.50E-03	4.25E-03	1.33E+00
Th-230	5.65E-05	1.80E-04	5.99E-05	1.38E-05	9.03E-04	1.23E-04	1.80E-01
Th-232	9.58E-04	3.67E-03	2.99E-04	6.90E-05	6.53E-03	2.16E-02	8.98E-01
Pa-231	1.80E-03	3.42E-03	1.16E-03	2.68E-04	2.34E-02	1.97E-03	3.49E-01
U-232	6.46E-03	3.26E-02	3.58E-02	1.65E-02	1.74E-03	1.16E-02	4.31E-02
U-233	1.43E-03	7.21E-03	7.89E-03	3.65E-03	2.68E-04	5.01E-06	9.51E-03
U-234	1.40E-03	7.06E-03	7.73E-03	3.57E-03	2.58E-04	6.60E-07	9.31E-03
U-235+D	1.32E-03	6.66E-03	7.29E-03	3.37E-03	2.46E-04	1.20E-03	8.78E-03

Table D3b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
U-236	1.33E-03	6.71E-03	7.35E-03	3.40E-03	2.45E-04	3.48E-07	8.85E-03
U-238+D	1.32E-03	6.68E-03	7.32E-03	3.39E-03	2.44E-04	1.89E-04	8.82E-03
Np-237+D	7.32E-02	1.39E-03	4.86E-04	1.12E-04	6.01E-03	2.53E-03	3.07E-01
Pu-236	1.97E-04	1.40E-04	9.79E-05	8.39E-06	4.45E-04	4.05E-04	8.08E-02
Pu-238	5.25E-04	2.19E-04	2.62E-04	2.02E-05	4.76E-03	4.03E-07	2.21E-01
Pu-239	5.82E-04	2.43E-04	2.90E-04	2.24E-05	5.71E-03	8.21E-07	2.45E-01
Pu-240	5.82E-04	2.43E-04	2.90E-04	2.24E-05	5.70E-03	4.23E-07	2.45E-01
Pu-241+D	1.22E-05	4.76E-06	5.62E-06	4.34E-07	1.40E-04	1.55E-06	4.73E-03
Pu-242	5.53E-04	2.30E-04	2.75E-04	2.12E-05	5.42E-03	3.70E-07	2.32E-01
Pu-244+D	5.46E-04	2.28E-04	2.72E-04	2.10E-05	5.36E-03	5.15E-03	2.29E-01
Am-241	2.39E-03	3.40E-04	5.96E-04	1.84E-04	5.76E-03	1.24E-04	2.51E-01
Am-242m+D	2.32E-03	3.57E-04	5.78E-04	1.78E-04	5.83E-03	1.78E-04	2.43E-01
Am-243+D	2.39E-03	3.39E-04	5.95E-04	1.83E-04	5.84E-03	2.51E-03	2.51E-01
Cm-242	5.33E-06	1.09E-04	1.25E-05	2.89E-06	2.93E-05	1.74E-08	7.95E-03
Cm-243	1.44E-04	3.11E-03	2.74E-04	6.34E-05	3.18E-03	1.28E-03	1.73E-01
Cm-244	1.15E-04	2.50E-03	2.21E-04	5.10E-05	2.26E-03	2.52E-07	1.40E-01
Cm-245	2.15E-04	4.66E-03	4.08E-04	9.45E-05	6.08E-03	9.72E-04	2.58E-01
Cm-246	2.13E-04	4.61E-03	4.04E-04	9.35E-05	5.94E-03	3.35E-07	2.56E-01
Cm-247+D	1.97E-04	4.26E-03	3.74E-04	8.64E-05	5.51E-03	4.97E-03	2.36E-01
Cm-248	7.83E-04	1.70E-02	1.49E-03	3.44E-04	2.19E-02	2.53E-07	9.40E-01
Cm-250+D	4.82E-03	9.69E-02	8.49E-03	1.96E-03	1.25E-01	4.86E-03	5.37E+00
Bk-247	3.09E-03	4.39E-04	7.70E-04	2.37E-04	7.53E-03	1.21E-03	3.87E-01
Cf-248	2.25E-02	3.04E-05	3.64E-05	8.42E-06	1.43E-04	3.53E-08	2.75E-02
Cf-249	3.90E-01	2.22E-04	5.18E-04	1.20E-04	7.44E-03	4.83E-03	3.90E-01
Cf-250	1.73E-01	9.87E-05	2.33E-04	5.38E-05	2.09E-03	2.08E-07	1.75E-01
Cf-251	3.99E-01	2.27E-04	5.30E-04	1.23E-04	7.70E-03	1.47E-03	3.99E-01
Cf-252	8.28E-02	4.79E-05	1.18E-04	2.72E-05	3.22E-04	9.39E-08	8.88E-02

The “Total” column is the sum of all the pathways shown in Table D3a and D3b.

Table D4a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
H-3	1.04E-04	1.19E-04	7.01E-05	1.01E-05	0.00E+00	0.00E+00
Be-10	2.28E-02	1.15E-01	5.10E-03	1.61E-02	1.06E-06	2.32E-06
C-14	1.10E-02	2.06E+01	2.29E-03	9.53E-05	6.19E-09	2.91E-08
Na-22	9.99E-02	4.79E-01	1.26E-02	3.49E-04	2.08E-08	2.33E-02
Al-26	5.42E-02	3.95E+00	1.60E-02	6.65E-04	4.38E-08	3.17E-02
Si-32+D	6.28E-02	1.09E-01	1.20E-02	4.70E-02	3.08E-06	2.46E-05
Cl-36	8.00E-02	1.10E-01	3.32E-03	9.99E-04	6.04E-08	4.61E-06
K-40	7.13E-02	3.83E+00	2.04E-02	5.65E-04	3.69E-08	1.85E-03
Ca-41	3.03E-03	1.32E-02	1.39E-03	5.80E-05	3.78E-09	0.00E+00
Ti-44+D	1.54E-01	6.74E+00	2.69E-02	2.06E-02	1.35E-06	2.58E-02
V-49	1.05E-04	2.52E-03	6.72E-05	1.57E-05	7.87E-10	0.00E+00
Mn-54	1.16E-02	2.76E-01	3.03E-03	3.06E-04	1.50E-08	7.30E-03
Fe-55	1.15E-03	2.51E-02	6.65E-04	6.11E-05	3.65E-09	0.00E+00
Fe-60+D	2.91E-01	7.78E+00	1.67E-01	1.23E-02	8.15E-07	1.51E-03
Co-60	7.59E-02	2.43E+00	2.95E-02	1.51E-03	9.44E-08	2.82E-02
Ni-59	1.18E-03	5.34E-03	2.30E-04	4.19E-05	2.76E-09	0.00E+00
Ni-63	3.22E-03	1.47E-02	6.32E-04	1.05E-04	6.89E-09	0.00E+00
Se-79	2.68E-02	3.20E-01	9.53E-03	2.99E-04	1.88E-08	3.90E-08
Rb-87	2.39E-02	1.96E+00	5.39E-03	1.47E-04	9.68E-09	3.08E-07
Sr-90+D	3.78E-01	2.20E+00	1.68E-01	1.13E-02	7.34E-07	5.01E-05
Zr-93	6.13E-03	1.04E-01	1.82E-03	3.80E-03	2.50E-07	3.77E-09
Nb-91	9.04E-04	3.37E-02	5.72E-04	1.46E-04	9.63E-09	2.48E-05
Nb-93m	8.79E-04	3.18E-02	5.72E-04	1.46E-04	9.48E-09	2.24E-07
Nb-94	3.02E-02	1.85E+00	7.82E-03	1.65E-03	1.08E-07	1.85E-02
Mo-93	3.98E-03	6.83E-03	1.48E-03	1.30E-03	8.44E-08	1.28E-06
Tc-99	4.23E-03	1.01E-02	1.60E-03	3.80E-04	2.39E-08	2.62E-07
Ru-106+D	6.69E-02	1.36E-01	3.00E-02	5.38E-03	2.75E-07	1.96E-03
Pd-107	1.17E-03	1.48E-03	1.63E-04	5.84E-04	3.84E-08	0.00E+00
Ag-108m+D	3.17E-02	1.36E+00	8.34E-03	1.15E-03	7.58E-08	1.88E-02
Cd-109	2.70E-02	5.44E-01	1.43E-02	5.20E-03	2.79E-07	2.63E-05
Cd-113m	3.43E-01	6.70E+00	1.76E-01	6.98E-02	4.50E-06	1.37E-06
In-115	4.22E-01	3.11E+03	1.73E-01	1.71E-01	1.12E-05	8.69E-07
Sn-121m+D	7.58E-03	1.34E+00	2.46E-03	5.43E-04	3.56E-08	4.61E-06
Sn-126+D	9.35E-02	1.43E+01	2.30E-02	4.61E-03	3.03E-07	2.32E-02
Sb-125	9.06E-03	1.37E-01	3.08E-03	5.56E-04	3.66E-08	4.40E-03
Te-125m	6.01E-03	2.95E-01	4.02E-03	3.32E-04	6.38E-09	9.67E-06
I-129	1.23E+00	3.44E+00	3.02E-01	7.93E-03	5.19E-07	2.82E-05
Cs-134	3.23E-01	2.94E+01	8.03E-02	2.11E-03	1.22E-07	1.61E-02
Cs-135	3.12E-02	2.82E+00	7.74E-03	2.07E-04	1.37E-08	8.39E-08
Cs-137+D	2.26E-01	2.03E+01	5.48E-02	1.45E-03	9.50E-08	6.56E-03
Ba-133	9.52E-03	1.75E-01	3.72E-03	3.56E-04	2.28E-08	3.94E-03
Pm-147	3.35E-03	9.58E-03	1.15E-03	1.79E-03	1.06E-07	9.89E-08
Sm-147	3.68E+00	4.62E+00	2.03E-01	3.41E+00	2.24E-04	0.00E+00
Sm-151	1.95E-03	3.91E-03	4.26E-04	1.37E-03	8.98E-08	2.15E-09
Eu-150	3.87E-02	1.19E+00	6.96E-03	1.22E-02	7.99E-07	1.70E-02

Table D4a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
Eu-152	3.27E-02	7.24E-01	7.10E-03	1.01E-02	6.51E-07	1.29E-02
Eu-154	4.13E-02	6.82E-01	1.05E-02	1.30E-02	8.33E-07	1.40E-02
Eu-155	4.55E-03	2.94E-02	1.68E-03	1.89E-03	1.17E-07	3.77E-04
Gd-152	1.13E+01	1.21E+01	1.76E-01	1.11E+01	7.30E-04	0.00E+00
Ho-166m	6.73E-02	1.63E+00	8.84E-03	3.52E-02	2.32E-06	2.01E-02
Re-187	2.15E-05	2.47E-04	1.04E-05	2.48E-06	1.63E-10	0.00E+00
Tl-204	8.80E-03	6.63E+00	3.68E-03	1.10E-04	6.75E-09	8.22E-06
Pb-205	2.60E-03	9.92E-02	1.78E-03	1.79E-04	1.18E-08	1.55E-08
Pb-210+D	8.77E+00	3.27E+02	5.88E+00	6.20E-01	5.22E-05	1.29E-05
Bi-207	2.70E-02	1.15E+00	6.00E-03	9.12E-04	5.96E-08	1.76E-02
Po-209	4.52E+00	2.82E+01	2.60E+00	4.88E-01	3.21E-05	3.86E-05
Po-210	3.46E+00	2.23E+01	2.08E+00	3.91E-01	1.39E-05	5.39E-08
Ra-226+D	2.73E+00	1.78E+01	1.46E+00	3.92E-01	2.64E-05	2.07E-02
Ra-228+D	2.72E+00	1.78E+01	1.58E+00	2.22E-01	1.41E-04	1.31E-02
Ac-227+D	1.00E+02	1.75E+02	1.62E+01	7.93E+01	5.16E-03	4.11E-03
Th-228+D	1.67E+01	3.29E+01	8.88E-01	1.56E+01	8.96E-04	1.58E-02
Th-229+D	8.50E+01	1.65E+02	4.41E+00	7.93E+01	5.23E-03	3.22E-03
Th-230	1.27E+01	2.36E+01	6.00E-01	1.19E+01	7.87E-04	6.10E-06
Th-232	5.63E+01	1.12E+02	2.99E+00	5.24E+01	3.46E-03	5.91E-04
Pa-231	7.33E+01	9.61E+01	1.16E+01	5.84E+01	3.91E-03	4.45E-04
U-232	2.72E+00	6.13E+00	1.43E+00	6.79E-01	1.74E-04	2.30E-03
U-233	8.12E-01	1.41E+00	3.16E-01	3.64E-01	2.39E-05	3.04E-06
U-234	7.98E-01	1.38E+00	3.10E-01	3.59E-01	2.33E-05	8.66E-07
U-235+D	7.48E-01	1.37E+00	2.92E-01	3.32E-01	2.16E-05	1.60E-03
U-236	7.56E-01	1.31E+00	2.95E-01	3.39E-01	2.20E-05	4.61E-07
U-238+D	7.37E-01	1.30E+00	2.93E-01	3.22E-01	2.09E-05	2.50E-04
Np-237+D	3.09E+01	4.99E+01	4.86E+00	2.46E+01	1.62E-03	2.27E-03
Pu-236	8.25E+00	1.31E+01	1.28E+00	6.61E+00	3.98E-04	6.43E-06
Pu-238	2.24E+01	3.60E+01	3.50E+00	1.79E+01	1.17E-03	3.30E-07
Pu-239	2.45E+01	3.96E+01	3.88E+00	1.96E+01	1.29E-03	6.23E-07
Pu-240	2.45E+01	3.96E+01	3.88E+00	1.96E+01	1.29E-03	3.21E-07
Pu-241+D	4.72E-01	7.67E-01	7.50E-02	3.76E-01	2.51E-05	9.85E-08
Pu-242	2.35E+01	3.78E+01	3.68E+00	1.87E+01	1.23E-03	2.81E-07
Pu-244+D	2.30E+01	3.75E+01	3.64E+00	1.84E+01	1.21E-03	3.91E-03
Am-241	2.54E+01	4.09E+01	3.99E+00	2.02E+01	1.33E-03	9.60E-05
Am-242m+D	2.44E+01	3.94E+01	3.85E+00	1.94E+01	1.30E-03	1.42E-04
Am-243+D	2.52E+01	4.08E+01	3.97E+00	2.01E+01	1.32E-03	1.91E-03
Cm-242	9.48E-01	1.43E+00	1.26E-01	7.89E-01	3.28E-05	2.18E-07
Cm-243	1.75E+01	2.82E+01	2.75E+00	1.40E+01	9.13E-04	1.23E-03
Cm-244	1.41E+01	2.27E+01	2.21E+00	1.13E+01	7.34E-04	2.72E-07
Cm-245	2.60E+01	4.20E+01	4.10E+00	2.07E+01	1.37E-03	7.40E-04
Cm-246	2.58E+01	4.15E+01	4.05E+00	2.06E+01	1.35E-03	2.55E-07
Cm-247+D	2.37E+01	3.86E+01	3.74E+00	1.89E+01	1.24E-03	3.78E-03
Cm-248	9.44E+01	1.52E+02	1.49E+01	7.52E+01	4.96E-03	1.92E-07
Cm-250+D	5.38E+02	8.69E+02	8.51E+01	4.29E+02	2.82E-02	3.70E-03
Bk-247	3.28E+01	5.66E+01	5.15E+00	2.62E+01	1.72E-03	9.25E-04
Cf-248	2.52E+00	4.17E+00	3.66E-01	2.02E+00	1.10E-04	2.10E-07

Table D4a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
Cf-249	3.34E+01	5.76E+01	5.19E+00	2.63E+01	1.73E-03	3.76E-03
Cf-250	1.51E+01	2.58E+01	2.33E+00	1.19E+01	7.71E-04	2.55E-07
Cf-251	3.41E+01	5.86E+01	5.31E+00	2.68E+01	1.77E-03	1.13E-03
Cf-252	7.85E+00	1.32E+01	1.18E+00	6.25E+00	3.72E-04	3.49E-07

“River Total” is the sum of all the pathways shown in Tables D4a, D4b, and D4c.
 “Well Total” excludes the pathways shown in Table D4c.

Table D4b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Veggie	Beef	Milk	Poultry	Egg
H-3	3.62E-10	8.98E-06	1.51E-06	1.22E-05	7.13E-07	3.78E-07
Be-10	9.33E-07	1.43E-03	8.54E-05	1.02E-06	5.54E-05	1.33E-06
C-14	4.13E-07	8.18E-04	1.94E-03	5.48E-03	2.66E-04	9.60E-05
Na-22	2.08E-06	3.85E-03	1.59E-02	4.29E-02	3.45E-06	9.96E-04
Al-26	2.92E-06	4.47E-03	4.00E-04	7.08E-04	1.30E-04	1.67E-04
Si-32+D	2.19E-06	3.47E-03	8.19E-06	5.42E-05	6.63E-05	1.28E-04
Cl-36	5.57E-07	2.46E-02	4.67E-03	4.60E-02	1.00E-05	3.22E-04
K-40	3.69E-06	6.96E-03	7.15E-03	3.39E-02	2.30E-04	2.77E-04
Ca-41	2.52E-07	4.55E-04	5.47E-05	1.06E-03	1.73E-06	8.34E-06
Ti-44+D	4.90E-06	7.54E-03	1.35E-02	5.96E-02	2.92E-06	1.06E-06
V-49	9.33E-09	1.81E-05	2.31E-06	2.59E-07	3.64E-07	7.00E-07
Mn-54	4.12E-07	8.76E-04	2.11E-05	1.77E-05	4.19E-06	2.42E-06
Fe-55	1.10E-07	1.84E-04	2.08E-04	4.20E-06	1.80E-05	8.67E-06
Fe-60+D	3.08E-05	4.68E-02	5.60E-02	1.16E-03	4.53E-03	2.18E-03
Co-60	5.11E-06	8.32E-03	4.80E-03	1.93E-03	1.61E-03	3.88E-05
Ni-59	4.21E-08	6.59E-05	1.93E-05	8.18E-04	6.26E-09	3.01E-07
Ni-63	1.15E-07	1.81E-04	5.29E-05	2.24E-03	1.72E-08	8.27E-07
Se-79	1.66E-06	2.69E-03	2.39E-03	8.46E-03	2.33E-03	1.12E-03
Rb-87	9.83E-07	2.05E-03	9.42E-04	1.49E-02	3.04E-04	2.19E-04
Sr-90+D	3.03E-05	5.60E-02	2.56E-02	1.16E-01	4.09E-04	4.92E-04
Zr-93	3.34E-07	5.09E-04	3.04E-08	2.22E-07	2.96E-09	4.75E-09
Nb-91	1.04E-07	1.61E-04	2.87E-09	5.20E-08	4.66E-09	7.47E-09
Nb-93m	1.03E-07	1.61E-04	2.84E-09	5.16E-08	4.66E-09	7.47E-09
Nb-94	1.43E-06	2.20E-03	3.93E-08	7.11E-07	6.37E-08	1.02E-07
Mo-93	2.69E-07	5.45E-04	2.57E-05	5.76E-04	4.14E-05	1.80E-05
Tc-99	2.79E-07	1.30E-03	2.57E-05	4.06E-04	1.08E-05	5.18E-04
Ru-106+D	4.26E-06	8.20E-03	2.11E-02	1.94E-05	1.96E-04	1.96E-06
Pd-107	2.98E-08	4.64E-05	1.10E-05	3.64E-04	1.34E-09	8.58E-09
Ag-108m+D	1.52E-06	2.33E-03	4.18E-04	9.24E-05	4.53E-04	5.45E-05
Cd-109	2.14E-06	4.10E-03	8.50E-05	2.92E-03	3.16E-04	1.90E-05
Cd-113m	3.16E-05	5.23E-02	1.20E-03	3.96E-02	3.91E-03	2.35E-04
In-115	3.16E-05	4.84E-02	2.31E-02	3.84E-03	1.41E-03	1.81E-03
Sn-121m+D	4.48E-07	6.91E-04	3.29E-03	5.46E-04	1.34E-05	2.58E-05
Sn-126+D	4.20E-06	6.45E-03	3.08E-02	5.11E-03	1.25E-04	2.41E-04
Sb-125	6.21E-07	9.00E-04	6.60E-05	5.43E-05	6.78E-07	3.53E-06
Te-125m	2.14E-07	9.20E-04	1.78E-04	2.26E-04	6.47E-05	2.59E-04

Table D4b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Veggie	Beef	Milk	Poultry	Egg
I-129	5.49E-05	8.52E-02	2.03E-01	6.18E-01	8.22E-05	1.19E-02
Cs-134	1.29E-05	2.34E-02	6.26E-02	1.34E-01	4.42E-03	4.26E-04
Cs-135	1.42E-06	2.32E-03	6.62E-03	1.38E-02	4.28E-04	4.12E-05
Cs-137+D	9.92E-06	1.64E-02	4.65E-02	9.73E-02	3.03E-03	2.91E-04
Ba-133	6.63E-07	1.05E-03	1.23E-05	3.93E-04	9.15E-07	4.40E-05
Pm-147	1.90E-07	3.17E-04	8.96E-05	4.84E-06	6.23E-08	3.00E-07
Sm-147	3.70E-05	5.68E-02	1.69E-02	8.99E-04	2.20E-05	1.85E-05
Sm-151	7.76E-08	1.19E-04	3.56E-05	1.89E-06	4.63E-08	3.90E-08
Eu-150	1.26E-06	1.95E-03	5.80E-04	3.08E-05	7.56E-07	6.37E-07
Eu-152	1.27E-06	1.98E-03	5.85E-04	3.12E-05	7.70E-07	6.49E-07
Eu-154	1.85E-06	2.92E-03	8.56E-04	4.57E-05	1.14E-06	9.56E-07
Eu-155	2.89E-07	4.65E-04	1.35E-04	7.22E-06	1.82E-07	1.53E-07
Gd-152	3.22E-05	4.94E-02	1.03E-02	7.82E-04	1.91E-05	1.61E-05
Ho-166m	1.62E-06	2.48E-03	6.65E-04	3.92E-05	9.60E-07	8.08E-07
Re-187	1.90E-09	3.35E-06	1.50E-06	3.68E-06	1.20E-08	5.78E-08
Tl-204	6.27E-07	1.02E-03	2.34E-03	1.57E-03	2.99E-05	3.84E-05
Pb-205	3.26E-07	5.01E-04	1.19E-05	9.90E-05	9.69E-06	1.87E-05
Pb-210+D	1.24E-03	1.70E+00	1.03E-01	3.66E-01	3.23E-02	6.29E-02
Bi-207	1.09E-06	1.68E-03	4.00E-05	6.63E-04	1.63E-05	6.28E-05
Po-209	4.73E-04	7.27E-01	2.17E-01	1.95E-01	6.34E-02	2.37E-01
Po-210	2.04E-04	5.29E-01	1.10E-01	1.15E-01	5.04E-02	1.89E-01
Ra-226+D	2.81E-04	4.11E-01	2.27E-02	4.23E-01	1.20E-03	2.62E-05
Ra-228+D	2.95E-04	4.44E-01	2.30E-02	4.45E-01	1.29E-03	4.60E-07
Ac-227+D	2.93E-03	4.53E+00	6.72E-03	7.14E-02	1.76E-03	4.23E-04
Th-228+D	1.42E-04	2.43E-01	8.09E-05	9.17E-04	9.62E-05	2.31E-05
Th-229+D	8.07E-04	1.23E+00	4.43E-04	4.89E-03	4.79E-04	1.15E-04
Th-230	1.10E-04	1.68E-01	6.29E-05	7.03E-04	6.52E-05	1.57E-05
Th-232	5.60E-04	8.39E-01	1.07E-03	1.43E-02	3.26E-04	7.81E-05
Pa-231	2.16E-03	3.26E+00	2.00E-03	1.33E-02	1.26E-03	3.03E-04
U-232	2.78E-04	4.07E-01	7.19E-03	1.27E-01	3.89E-02	1.87E-02
U-233	5.71E-05	8.88E-02	1.59E-03	2.81E-02	8.59E-03	4.13E-03
U-234	5.59E-05	8.70E-02	1.56E-03	2.75E-02	8.41E-03	4.05E-03
U-235+D	5.28E-05	8.21E-02	1.47E-03	2.59E-02	7.94E-03	3.82E-03
U-236	5.31E-05	8.27E-02	1.48E-03	2.61E-02	7.99E-03	3.85E-03
U-238+D	5.29E-05	8.24E-02	1.47E-03	2.60E-02	7.97E-03	3.83E-03
Np-237+D	8.86E-04	1.37E+00	8.15E-02	5.40E-03	5.29E-04	1.27E-04
Pu-236	2.15E-04	3.54E-01	2.20E-04	5.44E-04	1.07E-04	9.49E-06
Pu-238	6.39E-04	9.80E-01	5.85E-04	8.53E-04	2.85E-04	2.29E-05
Pu-239	7.09E-04	1.08E+00	6.48E-04	9.46E-04	3.16E-04	2.53E-05
Pu-240	7.09E-04	1.08E+00	6.48E-04	9.46E-04	3.16E-04	2.53E-05
Pu-241+D	1.39E-05	2.10E-02	1.35E-05	1.85E-05	6.11E-06	4.92E-07
Pu-242	6.73E-04	1.03E+00	6.15E-04	8.98E-04	3.00E-04	2.40E-05
Pu-244+D	6.65E-04	1.02E+00	6.08E-04	8.87E-04	2.96E-04	2.37E-05
Am-241	7.28E-04	1.12E+00	2.66E-03	1.33E-03	6.49E-04	2.08E-04
Am-242m+D	7.12E-04	1.08E+00	2.59E-03	1.39E-03	6.29E-04	2.02E-04
Am-243+D	7.27E-04	1.11E+00	2.66E-03	1.32E-03	6.47E-04	2.08E-04
Cm-242	1.48E-05	3.28E-02	5.94E-06	4.26E-04	1.36E-05	3.27E-06

Table D4b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Veggie	Beef	Milk	Poultry	Egg
Cm-243	4.98E-04	7.68E-01	1.60E-04	1.21E-02	2.98E-04	7.18E-05
Cm-244	3.99E-04	6.17E-01	1.28E-04	9.74E-03	2.40E-04	5.78E-05
Cm-245	7.49E-04	1.15E+00	2.40E-04	1.82E-02	4.45E-04	1.07E-04
Cm-246	7.41E-04	1.13E+00	2.37E-04	1.80E-02	4.40E-04	1.06E-04
Cm-247+D	6.85E-04	1.05E+00	2.19E-04	1.66E-02	4.07E-04	9.78E-05
Cm-248	2.72E-03	4.17E+00	8.72E-04	6.61E-02	1.62E-03	3.89E-04
Cm-250+D	1.56E-02	2.38E+01	5.37E-03	3.77E-01	9.24E-03	2.22E-03
Bk-247	9.41E-04	1.44E+00	3.44E-03	1.71E-03	8.38E-04	2.69E-04
Cf-248	5.55E-05	9.97E-02	2.50E-02	1.19E-04	3.96E-05	9.53E-06
Cf-249	9.48E-04	1.46E+00	4.34E-01	8.64E-04	5.64E-04	1.36E-04
Cf-250	4.18E-04	6.53E-01	1.92E-01	3.84E-04	2.53E-04	6.09E-05
Cf-251	9.71E-04	1.49E+00	4.44E-01	8.84E-04	5.77E-04	1.39E-04
Cf-252	1.96E-04	3.27E-01	9.22E-02	1.87E-04	1.28E-04	3.09E-05

"River Total" is the sum of all the pathways shown in Tables D4a, D4b, and D4c.

"Well Total" excludes the pathways shown in Table D4c.

Table D4c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
H-3	6.24E-07	1.10E-06	6.06E-07	4.61E-10	0.00E+00	1.26E-05
Be-10	1.54E-06	1.79E-05	4.47E-07	5.69E-04	1.77E-04	9.18E-02
C-14	3.37E-05	8.35E-05	3.13E-05	1.47E-04	1.29E-06	2.06E+01
Na-22	2.91E-04	1.10E-06	3.31E-04	2.57E-04	3.61E-01	1.81E-02
Al-26	7.22E-06	4.20E-05	5.60E-05	1.81E-03	2.45E+00	1.44E+00
Si-32+D	1.45E-07	2.11E-05	4.22E-05	1.17E-03	1.64E-03	4.33E-02
Cl-36	2.00E-05	8.73E-07	2.91E-05	4.69E-05	4.85E-05	2.98E-02
K-40	1.23E-04	7.14E-05	8.93E-05	1.53E-03	9.60E-02	3.66E+00
Ca-41	8.40E-07	4.89E-07	2.44E-06	1.00E-04	0.00E+00	1.00E-02
Ti-44+D	2.43E-04	9.45E-07	3.54E-07	2.63E-03	1.73E+00	4.85E+00
V-49	4.49E-08	1.18E-07	2.36E-07	4.97E-07	0.00E+00	2.42E-03
Mn-54	4.01E-07	1.33E-06	7.98E-07	2.07E-05	4.59E-02	2.18E-01
Fe-55	3.84E-06	5.83E-06	2.91E-06	1.44E-05	0.00E+00	2.39E-02
Fe-60+D	1.01E-03	1.46E-03	7.32E-04	2.11E-02	1.46E+00	6.01E+00
Co-60	8.69E-05	5.16E-04	1.29E-05	1.11E-03	7.64E-01	1.59E+00
Ni-59	3.46E-07	2.02E-09	1.01E-07	2.61E-05	0.00E+00	4.14E-03
Ni-63	9.51E-07	5.54E-09	2.77E-07	6.68E-05	0.00E+00	1.14E-02
Se-79	4.31E-05	7.52E-04	3.76E-04	2.50E-04	7.32E-07	2.91E-01
Rb-87	1.62E-05	9.45E-05	7.08E-05	5.64E-04	2.21E-05	1.94E+00
Sr-90+D	4.02E-04	1.18E-04	1.47E-04	1.46E-02	3.02E-03	1.81E+00
Zr-93	5.48E-10	9.56E-10	1.59E-09	2.26E-04	5.82E-06	9.81E-02
Nb-91	5.17E-11	1.50E-09	2.51E-09	6.25E-05	1.86E-03	3.09E-02
Nb-93m	5.13E-11	1.50E-09	2.51E-09	4.22E-05	1.15E-05	3.09E-02
Nb-94	7.07E-10	2.06E-08	3.43E-08	8.64E-04	1.40E+00	4.22E-01
Mo-93	4.45E-07	1.30E-05	5.83E-06	1.12E-04	6.21E-05	2.66E-03
Tc-99	4.82E-08	4.20E-07	2.10E-05	4.20E-05	4.93E-06	5.75E-03
Ru-106+D	4.05E-04	6.31E-05	6.58E-07	2.44E-04	1.40E-02	5.40E-02

Table D4c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Pd-107	1.97E-07	4.29E-10	2.86E-09	1.71E-05	0.00E+00	2.94E-04
Ag-108m+D	7.54E-06	1.46E-04	1.83E-05	8.54E-04	1.32E+00	7.51E-03
Cd-109	1.58E-06	1.01E-04	6.29E-06	1.44E-04	2.21E-04	5.16E-01
Cd-113m	2.11E-05	1.24E-03	7.73E-05	1.20E-02	6.52E-05	6.34E+00
In-115	4.17E-04	4.55E-04	6.07E-04	1.96E-02	6.73E-05	3.11E+03
Sn-121m+D	5.93E-05	4.32E-06	8.64E-06	2.46E-04	3.15E-04	1.33E+00
Sn-126+D	5.54E-04	4.03E-05	8.06E-05	2.60E-03	1.79E+00	1.24E+01
Sb-125	9.23E-07	1.62E-07	9.44E-07	8.69E-05	7.20E-02	5.54E-02
Te-125m	4.50E-06	2.11E-05	8.81E-05	5.10E-06	2.88E-05	2.89E-01
I-129	3.64E-03	2.65E-05	3.97E-03	2.58E-02	1.66E-03	2.17E+00
Cs-134	1.15E-03	1.41E-03	1.41E-04	1.32E-03	2.06E-01	2.89E+01
Cs-135	1.17E-04	1.36E-04	1.36E-05	8.78E-04	6.51E-06	2.79E+00
Cs-137+D	8.22E-04	9.60E-04	9.60E-05	4.95E-03	4.09E-01	1.97E+01
Ba-133	2.22E-07	2.94E-07	1.47E-05	2.19E-04	1.63E-01	2.68E-03
Pm-147	1.66E-06	2.02E-08	1.01E-07	2.40E-05	1.56E-06	6.21E-03
Sm-147	3.05E-04	7.10E-06	6.22E-06	2.26E-02	0.00E+00	9.11E-01
Sm-151	6.41E-07	1.49E-08	1.31E-08	4.40E-05	1.52E-07	1.92E-03
Eu-150	1.05E-05	2.44E-07	2.14E-07	6.49E-04	1.09E+00	6.26E-02
Eu-152	1.06E-05	2.49E-07	2.18E-07	4.93E-04	6.27E-01	6.38E-02
Eu-154	1.56E-05	3.67E-07	3.21E-07	5.78E-04	5.46E-01	9.41E-02
Eu-155	2.46E-06	5.88E-08	5.14E-08	5.95E-05	9.70E-03	1.51E-02
Gd-152	1.86E-04	6.18E-06	5.41E-06	1.99E-02	0.00E+00	7.93E-01
Ho-166m	1.20E-05	3.10E-07	2.71E-07	9.80E-04	1.52E+00	3.97E-02
Re-187	2.51E-08	3.65E-09	1.83E-08	1.12E-06	0.00E+00	2.25E-04
Tl-204	4.30E-05	9.68E-06	1.29E-05	1.09E-04	1.78E-04	6.62E+00
Pb-205	2.15E-07	3.13E-06	6.26E-06	2.03E-04	1.20E-06	9.63E-02
Pb-210+D	1.48E-03	1.03E-02	2.06E-02	6.66E-01	7.51E-04	3.17E+02
Bi-207	7.21E-07	5.26E-06	2.10E-05	5.49E-04	1.11E+00	1.08E-02
Po-209	3.91E-03	2.05E-02	7.96E-02	2.74E-01	2.80E-03	2.33E+01
Po-210	2.36E-03	1.64E-02	6.38E-02	6.30E-03	2.08E-07	1.87E+01
Ra-226+D	4.01E-04	3.83E-04	1.28E-07	3.94E-01	1.59E+00	1.31E+01
Ra-228+D	4.19E-04	4.15E-04	1.38E-07	1.02E-01	8.21E-01	1.42E+01
Ac-227+D	1.21E-04	5.68E-04	1.42E-04	1.35E+00	2.37E-01	7.29E+01
Th-228+D	1.51E-06	3.11E-05	7.79E-06	1.36E-02	1.90E-01	1.60E+01
Th-229+D	7.98E-06	1.55E-04	3.87E-05	5.01E-01	2.50E-01	7.94E+01
Th-230	1.11E-06	2.10E-05	5.26E-06	6.96E-02	7.27E-03	1.08E+01
Th-232	1.38E-05	1.05E-04	2.62E-05	5.04E-01	1.27E+00	5.38E+01
Pa-231	3.56E-05	4.07E-04	1.02E-04	1.81E+00	1.16E-01	2.09E+01
U-232	1.30E-04	1.26E-02	6.29E-03	1.34E-01	6.83E-01	2.58E+00
U-233	2.86E-05	2.77E-03	1.39E-03	2.06E-02	2.95E-04	5.69E-01
U-234	2.80E-05	2.72E-03	1.36E-03	1.99E-02	3.89E-05	5.58E-01
U-235+D	2.64E-05	2.56E-03	1.28E-03	1.90E-02	7.10E-02	5.26E-01
U-236	2.66E-05	2.58E-03	1.29E-03	1.89E-02	2.05E-05	5.30E-01
U-238+D	2.65E-05	2.57E-03	1.29E-03	1.88E-02	1.11E-02	5.28E-01
Np-237+D	1.47E-03	1.70E-04	4.26E-05	4.64E-01	1.49E-01	1.84E+01
Pu-236	3.92E-06	3.37E-05	2.81E-06	3.43E-02	2.38E-02	4.84E+00
Pu-238	1.05E-05	9.22E-05	7.68E-06	3.67E-01	2.37E-05	1.32E+01

Table D4c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Pu-239	1.17E-05	1.02E-04	8.50E-06	4.40E-01	4.83E-05	1.46E+01
Pu-240	1.17E-05	1.02E-04	8.50E-06	4.40E-01	2.49E-05	1.46E+01
Pu-241+D	2.37E-07	1.97E-06	1.64E-07	1.08E-02	9.11E-05	2.83E-01
Pu-242	1.11E-05	9.68E-05	8.06E-06	4.18E-01	2.18E-05	1.39E+01
Pu-244+D	1.10E-05	9.56E-05	7.97E-06	4.13E-01	3.04E-01	1.37E+01
Am-241	4.80E-05	2.10E-04	6.99E-05	4.44E-01	7.32E-03	1.51E+01
Am-242m+D	4.65E-05	2.03E-04	6.76E-05	4.49E-01	1.05E-02	1.46E+01
Am-243+D	4.79E-05	2.09E-04	6.97E-05	4.50E-01	1.48E-01	1.50E+01
Cm-242	1.16E-07	4.42E-06	1.10E-06	2.26E-03	1.02E-06	4.76E-01
Cm-243	2.89E-06	9.64E-05	2.41E-05	2.45E-01	7.55E-02	1.04E+01
Cm-244	2.32E-06	7.76E-05	1.94E-05	1.74E-01	1.49E-05	8.36E+00
Cm-245	4.32E-06	1.44E-04	3.59E-05	4.69E-01	5.73E-02	1.55E+01
Cm-246	4.27E-06	1.42E-04	3.55E-05	4.58E-01	1.97E-05	1.53E+01
Cm-247+D	3.95E-06	1.31E-04	3.28E-05	4.25E-01	2.93E-01	1.41E+01
Cm-248	1.57E-05	5.22E-04	1.31E-04	1.69E+00	1.49E-05	5.63E+01
Cm-250+D	9.40E-05	2.98E-03	7.46E-04	9.65E+00	2.86E-01	3.21E+02
Bk-247	6.20E-05	2.71E-04	9.02E-05	5.81E-01	7.15E-02	2.31E+01
Cf-248	4.88E-04	1.28E-05	3.21E-06	1.10E-02	2.08E-06	1.64E+00
Cf-249	7.82E-03	1.82E-04	4.55E-05	5.74E-01	2.84E-01	2.33E+01
Cf-250	3.48E-03	8.18E-05	2.04E-05	1.61E-01	1.22E-05	1.05E+01
Cf-251	8.00E-03	1.86E-04	4.66E-05	5.94E-01	8.66E-02	2.39E+01
Cf-252	1.71E-03	4.15E-05	1.04E-05	2.48E-02	5.53E-06	5.32E+00

"River Total" is the sum of all the pathways shown in Tables D4a, D4b, and D4c.

"Well Total" excludes the pathways shown in Table D4c.

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